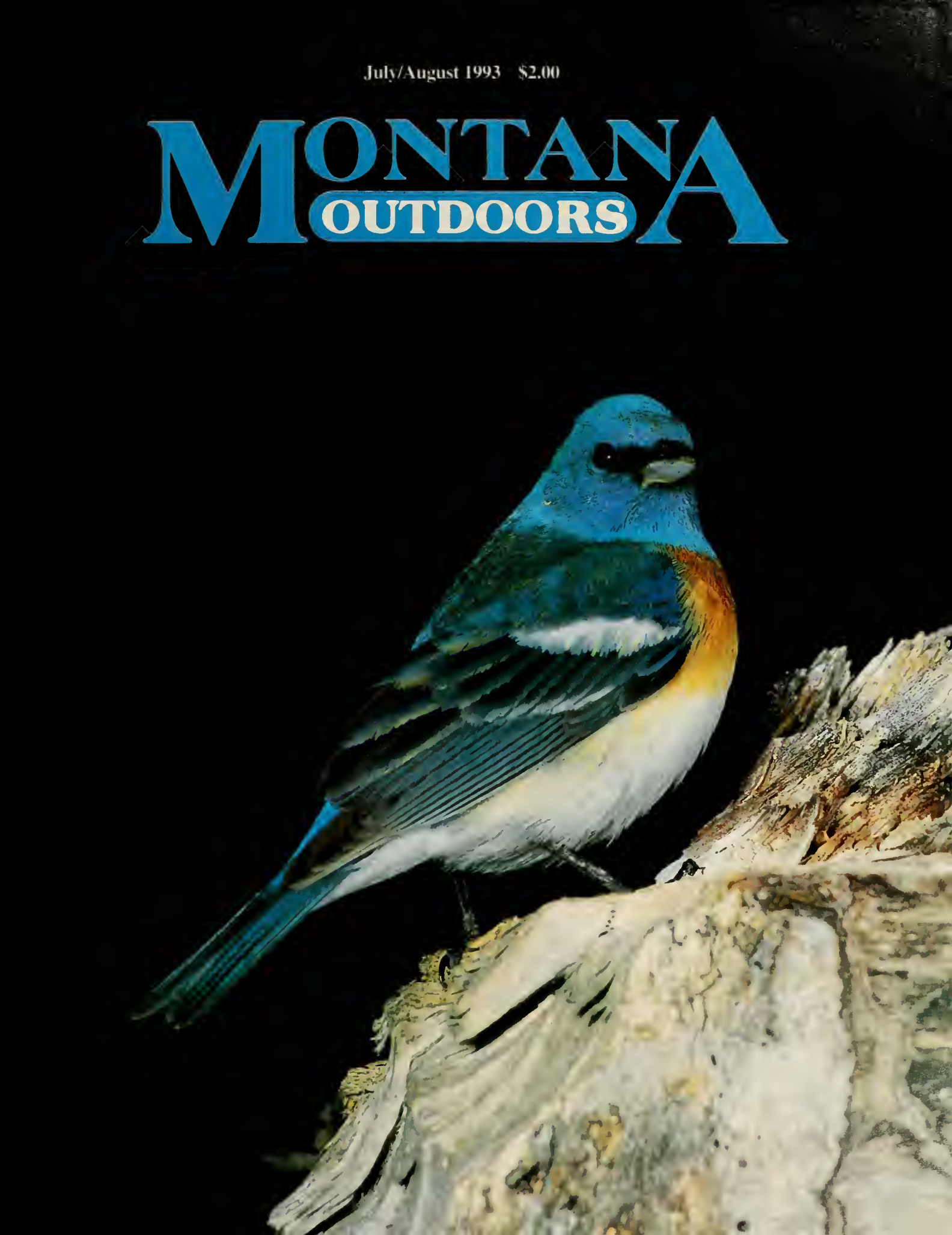
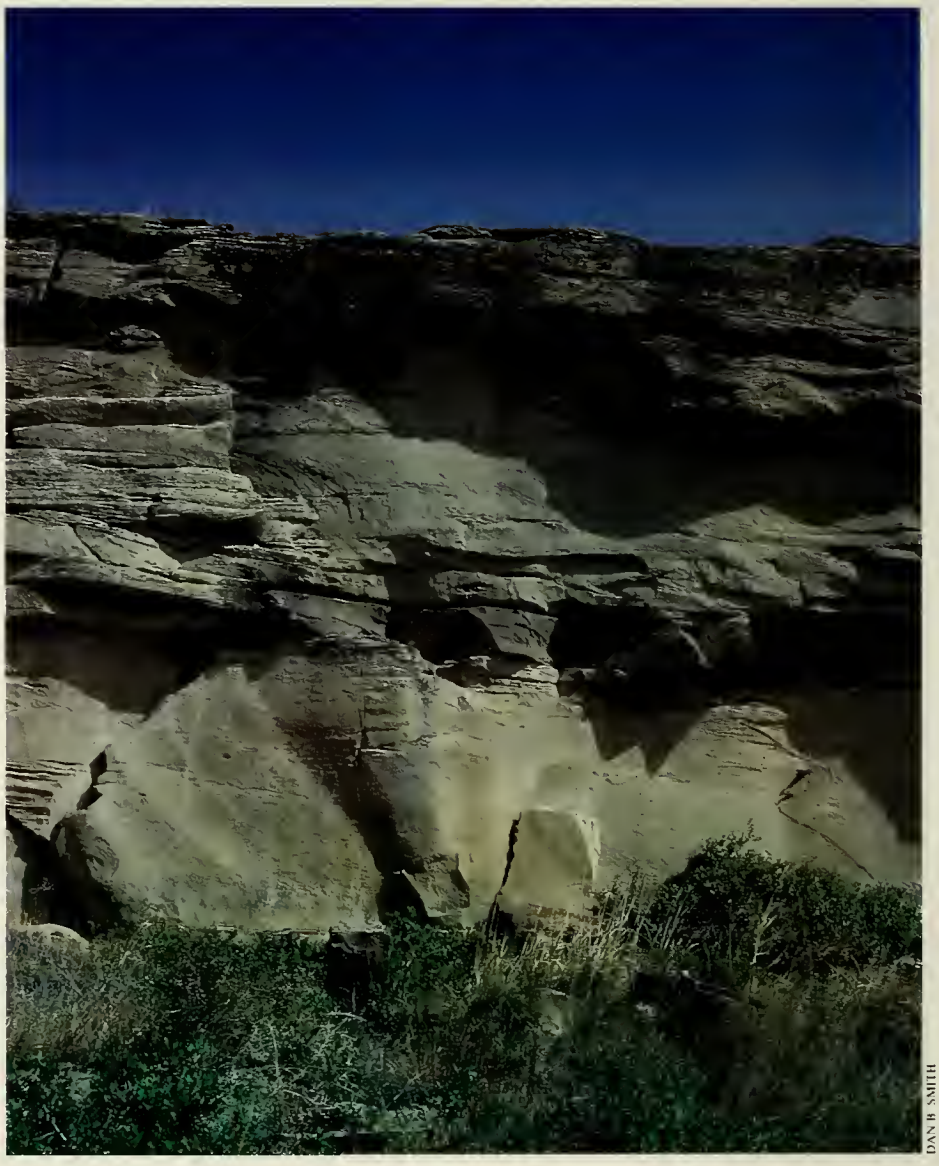
July/August 1993 $2.00

# MONTANA OUTDOORS



# Our Point of View


DAN B SMITH

*Ulm Pishkun State Park*

Fish and wildlife have long been important to people who live in the land called Montana.

The Indian nations that inhabited the plains and mountain valleys depended on many species of wildlife, but one reigned above all others—the bison. For centuries, plains Indians drove bison over bluffs like the one at Ulm Pishkun State Park.

Then came a period of change, sometimes violent, as European settlers arrived. They depended on game for food and convenience, but in the process nearly wiped out many species of wildlife.

Montana became a territory in 1864. The first territorial legislature met at a cabin in Bannack, a gold mining town destined to become one of our most popular state parks. Among all the matters of concern, these lawmakers passed Montana's first fish and game law—making a "rod or pole, line and hook...the only means to catch trout."

Local ingenuity forced new laws. In 1865, legislators prohibited baiting hooks with drugs and poisons and then had to ban the use of explosives to catch fish. Those were the "good old days."

By 1893, the state legislature found it necessary to stop the taking of moose, elk, otter, and beaver for six years and bison for a period of 10 years. That same year, the first and only game warden in the state was hired by Silver Bow County. It was a three-month-a-year job paying $100/month. Six people held the job in the first seven years. One can only imagine what a job it was.

With only one game warden in the state, the legislature of 1895 must have decided limiting, rather than eliminating, harvest would be the best course. Hunters were restricted to eight each of the following animals: deer, bighorn sheep, mountain goat, and antelope. The limit also included two moose and three elk. Those numbers masked the serious condition of the state's wildlife, but illustrate the dependence people had on wild game.

The problems of those days are a stark contrast to conditions today. Today's wildlife populations stand as a testament to the early and continued conservation efforts by many Montanans.

Today's challenges are related to that past. Ulm Pishkun, one of the largest buffalo jumps in the world (see page 27), is no longer the center of survival for the native people who live on the plains of central Montana. But it is a link to the past—an opportunity to understand and to bridge two cultures—two cultures that are still learning to live with each other.

Similarly, management in the Elkhorn Mountains near Helena symbolizes the new challenge facing game managers, hunters, and landowners (see page 33). Increased access, technology, and use require regulations that seem draconian compared with the limits imposed in 1895 when wildlife populations were a fraction of what they are today.

Who knows? Maybe *these* are the good old days.

Patrick J. Graham

***Patrick J. Graham***
***Director***
***Montana Dept. of Fish, Wildlife & Parks***

JOHN ASHLEY

*Harlequin ducks are arguably the most beautiful of our waterfowl. The best place to see them is along McDonald Creek in Glacier National Park (page 2).*

State of Montana
Marc Racicot/Governor

Fish, Wildlife & Parks Commission
Stan Meyer/Chairman
Jim Rector/Vice Chairman
Elaine Allestad
Charles Decker
David Simpson

Department of Fish, Wildlife & Parks
Patrick Graham/Director
Al Elser/Deputy Director for Field Operations
Dave Mott/Associate Director

Conservation Education Division
Ron Aasheim/Administrator
Vince Yannone/Assistant Administrator

*Montana Outdoors* Staff
Dave Books/Editor
Bev Veneziano/Art Director

***Montana Outdoors*** (ISSN 0027-0016), the official publication of the Montana Department of Fish, Wildlife & Parks, is published bimonthly (January, March, May, July, September, and November). Contributions (manuscripts or illustrations) are welcome with the understanding that the department or the editor cannot be responsible for loss or damage. All contributions will be published at the discretion of the editor. For subscription information, phone 800/678-6668 (toll-free). Subscription rates are $7 for one year, $12.50 for two years, and $17 for three years. (Please add $3 per year for Canadian subscriptions. All other foreign subscriptions, air mail only, are $22 for one year.) Individual copies and back issues cost $2 each. Although ***Montana Outdoors*** is copyrighted, permission to reprint articles is available by writing our office or phoning us at 406/444-2474. All correspondence should be addressed: ***Montana Outdoors***, Department of Fish, Wildlife & Parks, 1420 East Sixth; Helena, MT 59601. ©Montana Department of Fish, Wildlife & Parks, 1993. All rights reserved. Indexed by States' Periodical Index, 1660 Smithville Road; Havre, MT 59501.

Postmaster: Send address changes to ***Montana Outdoors***, Department of Fish, Wildlife & Parks, 1420 East Sixth; Helena, MT 59601. Second-class postage paid at Helena, MT 59601, and additional mailing offices.

# MONTANA OUTDOORS

**July/August 1993**
**Volume 24, Number 4**

## FEATURES

**2 Whitewater Wonder**
*by Dave Genter*
Considered a sea duck, the harlequin spends most of its time on coastal waters, coming inland only to nest on turbulent mountain streams.

**8 Perspectives—Art for the Parks**
*by Debbie Cheek*
Ryan Clampitt, a fifth grader at Jim Darcy School in Helena, won the second annual State Parks Poster Contest.

**15 Lands Legacy—Room With a View**
*by Bernie Kuntz*
Wall Creek Wildlife Management Area provides plenty of grass and open space for wintering elk and deer.

**19 Watchable Wildlife—Gem of the Bird World**
*by Erick Greene*
The lazuli bunting resembles a bluebird that has shrunk in the wash.

**24 Scratching for Answers**
*by Craig Spencer and Brent Loken*
Swimmer's itch is caused by a tiny parasitic worm, a member of the group of flatworms called flukes.

**27 Deep Blood Kettle**
*by Bruce Auchly*
Studies are yielding new information on the prehistoric people who ran bison over the cliff at Ulm Pishkun State Park.

**33 The Elkhorns Revisited**
*by John Vore*
Thanks to new regulations, hunters, photographers, and wildlife watchers are now seeing elk of all ages in the Elkhorn Mountains.

## DEPARTMENTS

**11 Catchall**
**14 Contributors**

## COVERS

Covers—Male lazuli buntings, like the front-cover gem photographed by Tom J. Ulrich of West Glacier, have distinctive songs—in essence, each male's song is an acoustic fingerprint. In the Elkhorn Mountains southeast of Helena, elk hunting is by far the most popular recreational pursuit. But the Elkhorns have their attractions in other seasons, too, as Helena photographer John Vore's spring scenic attests.

# Whitewater

LEE RENTZ

IT WAS THE THIRD WEEK of June in 1990 when I received a call from Marion Cherry, biologist for the Gallatin National Forest. She was under pressure from Hollywood moviemakers to allow them to begin filming along the scenic Boulder River in south-central Montana. "A River Runs

# Wonder

by Dave Genter

Through It" vs. "the ducks that nest there" was the script. I wondered aloud how an environmentalist like Robert Redford could be involved with a project that would potentially jeopardize nesting for one of the rarest birds in the state, the harlequin duck.

The stretch of river upon which the cast, crew, caterers, support staff, and throngs of tourists would descend was precisely where one of the two harlequin hens nesting in the drainage would be incubating a clutch of four to six eggs. These birds had flown more than 700 miles from the Pacific Coast to the Boulder River to nest where they had nested the year before, and the year before that. Odds are good that the hen will use this same site for several more years. With Marion's tactful persuasion, the harlequins prevailed and the moviemakers deferred filming until after the clutch hatched.

A success story with some local color? Perhaps. But success is the exception rather than the rule for these unique birds. Some people may wonder, *Why the big fuss over*

JOHN WINNE JR

*Harlequin ducks (the subject of Montana's 1993 Waterfowl Stamp) are among the most beautiful of our waterfowl. The brightly colored males (right) are seldom far from their mates (below) during the peak of courtship. Although young harlequins are adept swimmers, hens with broods (opposite page) prefer quiet backwaters until the ducklings are strong enough to feed in faster water.*

JOHN ASHLEY

*a few ducks? What the heck is this harlequin duck, anyway?* It's not surprising that many people have not heard of the harlequin, since it's rarely seen even by avid waterfowl and bird enthusiasts. Considered a sea duck, the harlequin spends most of its time on coastal waters, coming inland only to nest on turbulent mountain streams. As I like to remind folks, it's Montana's only "anadromous" species.

Montana's harlequins are part of the Pacific population that winters from the Oregon coast northward to the Aleutian Islands (see map). The breeding range covers much of the Pacific Northwest, British Columbia, and western Alaska. The Atlantic population inhabits the maritime provinces of Canada and winters as far south as New England.

Harlequin ducks (the subject of Montana's 1993 Waterfowl Stamp) are arguably the most beautiful of our waterfowl. The males are a spectacular slate-blue with flanks of cinnamon-chestnut and brilliant white spots and crescents across the back, chest, and face. Its namesake, "Harlequin," the clown of 17th century Italian comedy, was similarly attired in gaudy cloth and colorful tights. Even the scientific name for the species, *Histrionicus histrionicus*, relates to the theatrical appearance of these birds. As with most ducks, the harlequin female's plumage is less conspicuous: brown and gray with three white patches on the face and head.

When I first started to work on harlequin ducks in 1986, little was known about their distribution and status in the state. For that matter, little research had been done on this species outside of some studies in Iceland. Much of what was known in Montana could be attributed to two sources: Larry Thompson's article in *Montana Outdoors* (March/April 1985), and Craig Knehel's classic study of harlequins along McDonald Creek in Glacier National Park (the subject of his Master's thesis at the University of Montana).

Our early investigations were aimed at determining harlequin duck numbers and distribution. Most of the streams they frequent in Montana flow through lands managed by the U.S. Forest Service, which lists the harlequin as a "sensitive species" (species that warrant special consideration to prevent their numbers from dropping so low that they become eligible for listing under the Endangered Species Act). In accomplishing the enormous task before us—surveying the mountain streams of western

Montana—we were greatly aided by the Forest Service, which contributed funding and personnel primarily through its "Challenge Cost-Share Program." Similar efforts have been undertaken in Idaho as well.

To conduct the survey, Natural Heritage Program biologists and volunteers spent thousands of hours of walking up and down mountain streams. We also used a poster soliciting sightings of harlequins. From this we pieced together a better picture of the harlequin duck's status in Montana. The more we looked, the more we found...up to a point.

Our survey showed that several areas of the state maintain significant populations of harlequins. These include the upper Flathead River drainage, the upper Sun River drainage, and tributaries to the lower Clark Fork and Kootenai rivers. A few small stream populations exist in the Blackfoot River drainage, in tributaries to the Yellowstone River from the Boulder River up into Yellowstone National Park, and in several tributaries along the Rocky Mountain Front.

Harlequin ducks were probably never common in Montana. But historical information indicates they were once more widespread than they are now. According to Dr. Bob Eng of Montana State University, the Boulder River, where only two pairs reside today, had six to eight pairs in the mid-1970s. Other streams where harlequins seem to have disappeared include the nearby Stillwater River, the tributaries of the upper Gallatin River, Rattlesnake Creek near Missoula, and streams of the west Mission Mountains. The disappearances are a mystery, because most of these areas do not appear to have suffered significant changes in water quality or land use.

Further complicating the puzzle is the fact that not all populations are in decline. Recent counts on McDonald Creek have yielded numbers comparable to those recorded by Craig Kuchel in the 1970s. Monitoring on some other streams in western Montana also indicates stable populations. Perhaps a look at the life history of this bird will lend some clues.

In their habitat along the Pacific Coast, harlequin ducks are fairly gregarious, gathering in groups that range in size from a dozen or so birds to flocks of several thousand. These large concentrations are generally seen around rich food sources, such as herring spawn in coastal bays. Harlequins seem to flock up in March just prior to their migration inland to nest. By this time, pair bonds have been formed; mated pairs leave the coast in late March and April and take several days to reach the stream where courtship and breeding will take place.

Unpaired males, typically second- and third-year birds, also fly inland to join the mated pairs. While they spend most of their time on the streams in bachelor groups of two to four, they regularly challenge the paired males for access to the hens. Although harlequins are not strictly territorial, the paired males maintain a "mobile" territory around the hen. It is rare to see a hen more than a few feet away from her mate during the peak of courtship. Throughout this period the birds engage in highly ritualized and animated displays.

After three or four weeks of courtship and copulation, the hen leaves the male and goes farther up the drainage to seek a nest site. Harlequin nests have been found in several situations: hollow snags and cavities, cliff ledges, log-jam debris, and on the ground. After breeding, the males gather for a few weeks of loafing and feeding prior to their return flight to the coast, usually by the end of June. The hen stays to incubate her eggs, a process requiring about 28 days. The clutch of two to eight eggs (typically five) is considered small for waterfowl species. The fact that harlequins do not renest after losing a clutch further depresses the species' reproductive potential.

In a good year nearly 50% of the hens that arrive on the breeding streams in Montana will produce a brood. During years of high or prolonged runoff (such as 1991), as few as one in eight hens will produce young. Average brood size at fledging is about four young. Reproductive rates here are higher than in northern Idaho but less than on some coastal streams. Because clutch sizes are similar in all three areas, differences in productivity seem to be related to success of producing broods.

Harlequins are selective in their choice of breeding habitat, favoring turbulent, whitewater streams with abundant populations of aquatic insects, especially stoneflies. These streams tend to mimic the crashing waters of the coastal environment. We were initially surprised to learn that nearly all of the breeding streams had gradients of between 1% and 2%, and contained signifi-

JOHN WINN JR

eant reaches of oxbows or backwaters from beaver impoundments. These slower waters appear critical for the early rearing of young ducklings. After a few weeks, though, the young birds are out in the faster water gleaning insects off the bottom. Even at an early age, harlequins are quite adept at moving in fast water, above or below the surface.

As summer progresses, the ducklings grow rapidly on a diet of protein-rich aquatic insect larvae and an occasional sculpin. They are nearly full-grown by late August. Males are slightly larger than females; adult birds weigh about 1.5 pounds and are about the size of teal.

The month of August provides halcyon days for young harlequins. They are big enough to maneuver in any water and they have few predators. Only one event interrupts this peaceful interlude: The hen soon leaves her brood to return to the coast. Most, but not all, of the harlequins still on the streams by late August are young-of-the-year birds. They will soon figure out on their own that it's time to head downstream and start flying to the coast to join the others.

JOHN ASHLEY

*Dave Genter simultaneously releases a harlequin hen and her brood following leg banding. Banding is a valuable tool for gathering information on waterfowl dispersal, mortality, and population trends.*

There are several possible explanations for the early departure of the hens, but the most plausible is that they need to get back to the coast to begin the annual molt, or replacement of feathers. By this time of summer, the males and nonbreeding adults that left Montana earlier have already molted. Since the molt leaves the birds flightless for several weeks, it is not feasible to do it on the streams. Feather replacement requires significant amounts of energy and the food sources on the coast are much greater than those of the inland streams.

WHERE DO OUR BIRDS GO? Based on band returns, sightings of marked birds, and monitoring of several radioed birds from Idaho and Wyoming, probably northwestern Washington, around the San Juan Islands. We have yet to receive any returns from 91 birds banded over the past two years in Montana. Several bands from harlequins banded in Idaho and Wyoming have been returned from hunters along the Washington coast. Although harlequins are legal game birds in Montana, due to their early departure and unusual habitat they are rarely taken here. Sport hunting is more common in waters of British Columbia and Alaska, where the popularity of sea duck hunting is increasing.

The shipping lanes that cross harlequin feeding areas along the coast appear to pose a much larger threat. When the Exxon Valdez fouled the waters of Prince William Sound, it killed tens of thousands of seabirds. Harlequin ducks were thought to be hit especially hard because of the pre-breeding congregations in the area of the spill. Recent studies from Alaska reveal that harlequins are highly vulnerable to recontamination through the food chain, especially mussels. Reproductive failure caused by high concentrations of petroleum hydrocarbons and residues in their organs could lead to extinction of harlequins in local areas affected by oil spills. This raises great concern over the fate of our birds, since smaller oil spills and dumping occur with alarming regularity along the coast of Washington.

Harlequins exhibit high fidelity to their breeding areas, returning each year to the same stretch of stream to nest and raise their young. They likely do the same for wintering areas. As a result, they make poor colonizers. We hope to further address this by monitoring marked birds for several more years. A key issue is the survival and dispersal of juvenile ducks. With low reproductive rates and delayed breeding (females start at 2 or 3 years; males typically at 4 or 5 years), these birds cannot sustain high mortality.

In April of 1992, a group of biologists working on harlequin ducks gathered at Moscow, Idaho, to share research results and discuss mutual concerns about harlequin populations. They represented state, federal, provincial, and private groups from the U.S. and Canada. The biologists agreed to collaborate in producing a range-wide status report, a project that has recently been completed and represents the most comprehensive review of the species to date. Some disturbing trends emerged, such as the continued decline of the Atlantic population, now estimated at only 1,000 birds. While the Pacific population is considerably larger at 150,000 to 300,000 birds, it too has declined sharply from an estimated one million just 20 years ago.

Since Montana is at the periphery of the harlequin duck's range, I had always assumed that our birds were a minor part of the U.S. population. Not so. We have approximately 120 breeding pairs, second only to Washington's 274 pairs. The total for the Pacific Northwest and Rocky Mountains is estimated at 514 pairs. Oregon, Idaho, and Wyoming are believed to have no more than 50 pairs each.

The report recognizes that population regulation in harlequins is complex and affected by a number of factors. Threats to the birds on the breeding areas include: destruction of riparian areas along breeding streams; destabilization of stream flow and habitat degradation from mining, roading, or timber harvest; loss of breeding habitat

by river impoundment or dewatering of streams; and disturbance from recreational river users in breeding areas.

Based on this, it is not surprising that most of our breeding streams are in national parks or remote, primitive areas of the national forests. The potential impact of recreationists on harlequins in such areas should not be overlooked. A study in Alberta's Jasper National Park demonstrated the decline of the harlequin duck population during the start-up and rapid growth of commercial river floating on the Maligne River. This is an important consideration for management of primitive river recreation in areas where harlequin ducks still breed.

Montana's wildlands and pristine streams, which have long provided sanctuary for grizzly bears and bald eagles, are proving a safe haven for yet another species in peril. Such sanctuaries are becoming all too scarce in other parts of the country. This summer I will again look for harlequins along the Boulder and other rivers, traveling the wild and scenic country they frequent. Their continued presence means more to me than the opportunity for collecting data or the simple enjoyment of being there. It reconfirms the biological integrity of these fragile ecosystems and reminds me of our subtle linkages to the larger world outside of Montana. Perhaps it is the embodiment of the forest-sea connection and the millennia of migration to the ancestral breeding grounds. ■

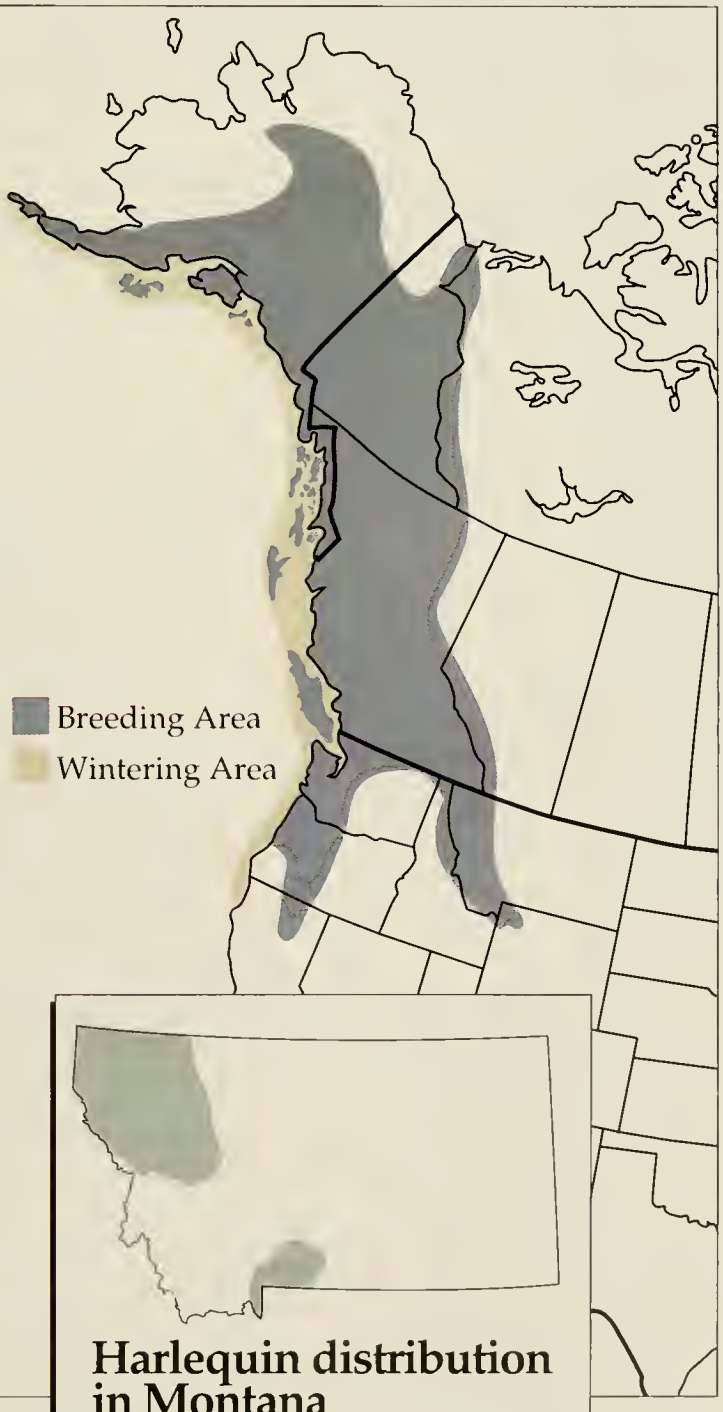
# Watch for Harlequins

HARLEQUIN DUCKS ARE QUITE RARE and generally frequent inaccessible streams. There are a few areas where people can view these birds with relative ease. Perhaps the best known is along McDonald Creek in Glacier National Park. Another area where harlequins gather is above Kootenai Falls west of Libby. Both of these areas offer relatively easy access and allow wildlife viewers a chance to see these shy birds without disturbing them.

The best time to see harlequins is during May and early June while the males are still here. After that the hens are very secretive and rarely seen. Mid-August is the best time to see hens with their broods. Look for them resting on rocks or along the edges of streams. It is quite a show to see the birds feeding and swimming in the turbulent water.

It is important to remember that these birds are sensitive and should not be approached or disturbed. Use binoculars and keep your distance. This allows the birds to behave normally and not leave the area. Be careful when walking along whitewater streams—rocks tend to be slippery from constant spray and aquatic growth, posing a hazard for people and expensive optical equipment.

For those fortunate enough to see these birds in the backcountry, we would appreciate it if you would document the observation by writing down the location, date, and any other circumstances and pass the information along to the nearest U.S. Forest Service, National Park Service, or Montana Department of Fish, Wildlife & Parks official.




**Harlequin distribution in Montana**

# Art for the Parks

by DEBBIE CHEEK

This spring, the Parks Division of the Department of Fish, Wildlife & Parks conducted its second annual State Parks Poster Contest for fifth grade students as a means of enhancing understanding and awareness of Montana's state park system. In April a panel of five judges selected the winning posters.

Ryan Clampitt, a student at Jim Darcy School in Helena, won the top award; Kirsten Bichler, Eureka Elementary School, took second; and Ryan Pillsbury and Leslie Steward, both of Eureka Elementary School, tied for third. Receiving honorable mention were: Tanner Duncan, Ray Bjork School, Helena; and Meagan Thompson, Whittier School, Butte. All poster contest participants received T-shirts with the winning poster design printed on the front.

The winning entries have already been displayed at department headquarters in Helena, Kalispell, and Great Falls, and will be on display in Bozeman from July 12 to July 30; Billings, July 31 to August 18; Miles City, August 19 to September 10; and Missoula, September 13 to September 30.

**First Place — Ryan Clampitt, Jim Darcy School in Helena**

Ryan's poster depicts an eye-catching array of the wildlife he observes when he enjoys Montana's State Parks. As the top winner in the contest, Ryan received a $150 savings bond and a T-shirt with his poster printed on the front. His school received a video about Lewis and Clark Caverns and a copy of "Great Escapes," a book describing the diverse features of Montana's State Park System. Ryan received his awards at an end-of-the-year school assembly; FW&P Parks Division Administrator Arnie Olsen and Montana's First Lady, Theresa Racicot, made the presentation.

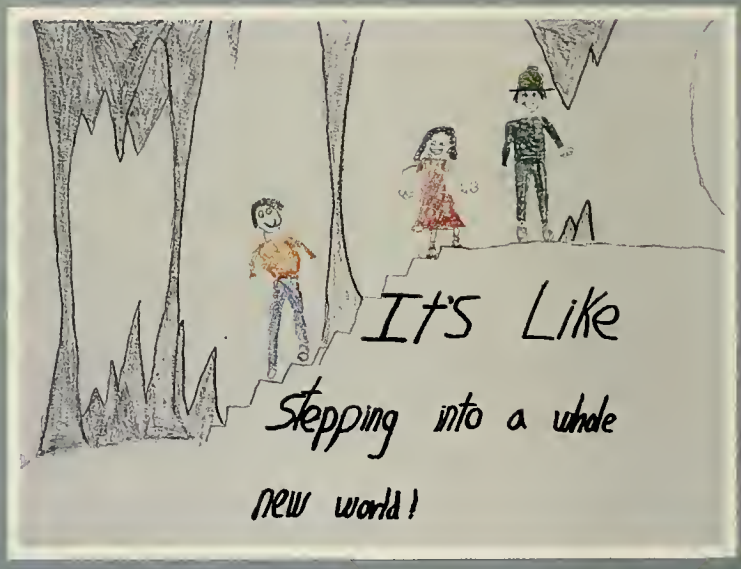
## Second Place — Kirsten Bichler, Eureka Elementary School

Kirsten's poster displays an example of the "large" fish that can be caught during an enjoyable day of fishing at Flathead Lake State Park. As the second-place winner, she received a $100 savings bond and a T-shirt with the winning poster printed on the front.

*2nd Place — Kirsten Bichler*

## Third Place (tie) — Ryan Pillsbury, Eureka Elementary School

Ryan's poster emphasizes that a tour of Lewis and Clark Caverns State Park is like "stepping into a whole new world." His tie for third place netted him a $50 savings bond and a T-shirt with the winning poster on the front.




*3rd Place (Tie) — Ryan Pillsbury*

## Third Place (tie) — Leslie Steward, Eureka Elementary School

Leslie's poster of "diving for gold" at Whitefish State Park is a bright and colorful example of the beauty that exists in our state parks. His tie for third place earned him a $50 savings bond and a T-shirt with the winning poster on the front.

*3rd Place (Tie) — Leslie Steward*

# DEPARTMENT EMPLOYEES GARNER AWARDS

Four FW&P employees were honored by the Montana Wildlife Federation at its annual meeting in April. Vince Yannone, assistant administrator of the department's Conservation Education Division, received the federation's "Conservation Communicator" award for 1993. This award is presented to "the individual who shows outstanding achievement in effectively conveying the natural resource conservation message and creating public awareness of conservation issues in the news media." Perhaps the most widely recognized FW&P employee, Yannone has entertained thousands of Montanans with his educational wildlife programs.

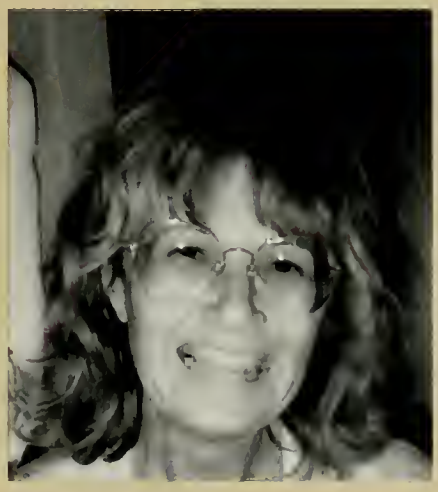
Kurt Cunningham, the department's youth education coordinator, was the recipient of this year's "Special Achievement" award. Cunningham coordinates Project WILD, a national conservation and environmental education program administered in Montana by FW&P and the Office of Public Instruction. Since 1984, Project WILD has provided conservation education materials and workshops to more than 3,600 educators in Montana. In turn, these educators have used Project WILD materials to teach more than 60,000 Montana students about wildlife, the importance of habitat, and the responsible actions people can take to protect the environment

Special projects coordinator Heidi Youmans and law enforcement officer Gary Burke were co-recipients of this year's "Les Pengelly Conservation Professional" award. Youmans and Burke served, along with department attorney Bob Lane, on the governor's working group on game farms, a committee that provided valuable legislative direction on the game farm issue. Youmans compiled technical information in a "white paper" that served as the basis for new laws and regulations governing game farms, while Burke worked with several states and provinces in a coordinated effort to curtail illegal activity surrounding some game farm operations.

Department cinematographer Mike Gurnett was named "Conservationist of the Year" by the George Grant Chapter of Trout Unlimited at its May banquet in Butte. Gurnett was honored for his role in producing "Three Men—Three Rivers," the department's new documentary film exploring the lives of three noted Montana conservationists and their efforts on behalf of the Big Hole, Madison, and Yellowstone rivers. Gurnett is head of the department's Film Production Unit.

## KAY ELLERHOFF NAMED EDITOR OF *FALCON* MAGAZINE

Kay Morton Ellerhoff, who worked 20 years as associate editor of *Montana Outdoors*, left in April to become editor of *Falcon*, a new conservation magazine scheduled for start-up this fall. Published by Falcon Press of Helena, *Falcon* is a



*Kay Morton Ellerhoff*

national conservation magazine targeted for school children in grades 4 through 8. The magazine will be published in numerous editions with a core of material appropriate for a national audience as well as a customized state version for each participating state. Four issues (September, November, January, and March) are scheduled for production during the 1993-94 school year.

A Kalispell native and graduate of the University of Montana Journalism School, Ellerhoff joined *Montana Outdoors* in its third year of publication and was instrumental in its development as a nationally acclaimed state conservation magazine. On her 20-year anniversary with the department earlier this year, the Montana Fish, Wildlife & Parks Commission congratulated her for numerous contributions and accomplishments: "Your special knack for working harmoniously with authors from many disciplines has helped countless biologists, park managers, wardens, and administrators tell their stories in clear, lively, readable prose. As a result, *Montana Outdoors* has enjoyed exceptional cooperation and support from contributors both within and outside of the department."

*Montana Outdoors* will miss Kay's deft creative touch and the energy and enthusiasm she brought to each new issue.—*Montana Outdoors Staff*

## DEPARTMENT FILM WINS FILM FESTIVAL AWARD

"Three Men—Three Rivers," the Department of Fish, Wildlife & Parks documentary that chronicles the efforts of three heralded Montana conservationists and the rivers they fought to protect, received a first-place award from among all agency-produced films at the recently completed International Wildlife Film Festival in Missoula.

The film also received honorable mention in both the "cinematography" and "instilling a conservation ethic" categories.

The film, directed and produced by FW&P cinematographer Mike Gurnett, is available free of charge for screening at meetings classes or conventions. Copies of the 30-minute film also are available for sale on 16-mm film and VHS tape.

For more information contact the FW&P Film Center, 930 Custer Avenue, Helena, MT 59620; telephone (406) 444-2426.

## Dedication Set for Elk Winter Range

As early as 1917, concerned voices echoed the need to protect elk winter range and migration routes north of Yellowstone National Park. It took more than 70 years but finally a strong partnership formed to help conserve thousands of acres of winter range for the world's largest migratory elk herd. The partners in the Northern Yellowstone Elk Herd Project will celebrate this nationally significant conservation project this July with a dedication ceremony.

In 1988 the Rocky Mountain Elk Foundation (RMEF), U.S. Forest Service, National Park Service, and Montana Department of Fish, Wildlife & Parks joined forces to work on the Northern Yellowstone Elk Herd Project. Together the partners invested more than $10 million in 11 habitat acquisitions, spurred into action by an eye-opening summer of severe wildfires and drought.

Few people remember any fire bigger than the one that swept through Yellowstone National Park during the summer of 1988. After burning more than 800,000 acres within the park, the fires left Yellowstone's northern elk herd to face a tough winter with diminished winter range. More than 20,000 elk would have to move farther and farther out of the park to find forage on lands that were increasingly threatened by development.

Historically, thousands of elk and other wildlife migrated out of the park each winter to find less snow and more food. But none of those lands beyond park boundaries were protected for wildlife. When President Ulysses S. Grant created this nation's first national park in 1872, he focused on the more scenic, forested and well-watered summer range for wildlife.

But today, the Northern Yellowstone elk herd can rely on nearly 9,000 acres of prime winter range and migration corridors thanks to this unique public/private partnership and the commitment of conservation-minded landowners to preserving habitat for this historic herd.

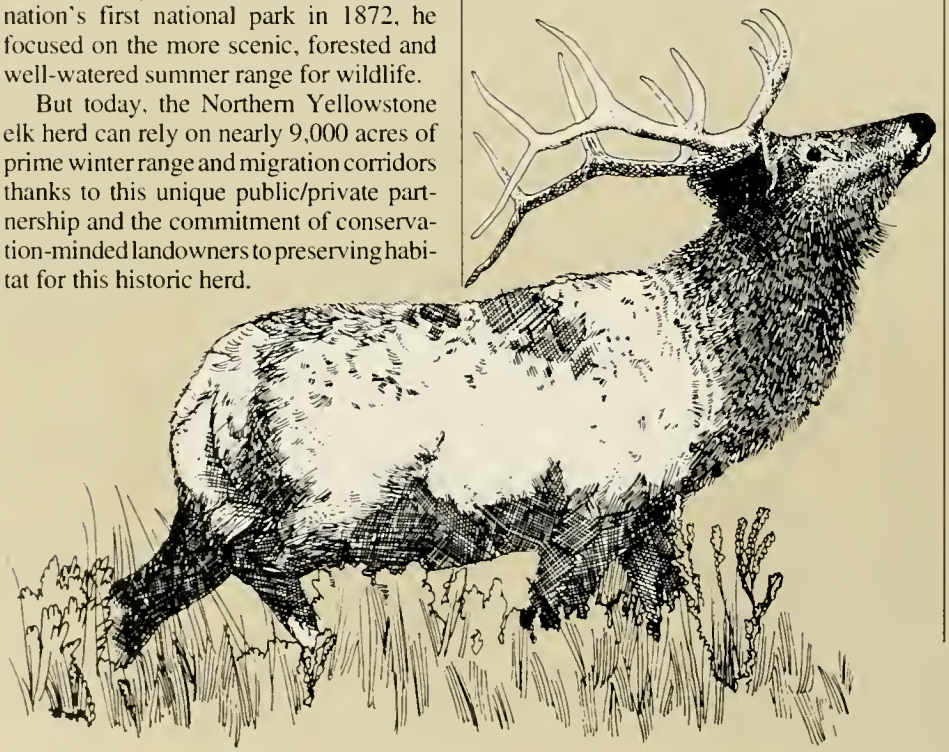
On Saturday, July 17, the project partners will hold a national dedication ceremony on the Hayes Ranch—one of the Northern Yellowstone habitat acquisitions. The public is invited to the celebration, which will begin with dedication speakers at 10 a.m. State and federal agencies, wildlife and conservation groups, ranchers, landowners, and other outdoor enthusiasts will all be represented at the ceremony.

At noon, guests can enjoy a barbecue lunch, followed at 2 p.m. by live musical entertainment. If guests plan to eat lunch at the dedication, they must RSVP to the Elk Foundation by calling 1-800-CALL ELK, ext. 512. Tickets cost $5 for adults and $2 for children 10 and under. Beverages are not included in the ticket price. Also from 2-4 p.m., the public will have the opportunity to tour several of the Northern Yellowstone acquisitions.

The Rocky Mountain Elk Foundation is an international, non-profit conservation organization whose mission is to ensure the future of elk and other wildlife by conserving, restoring, and enhancing natural habitats. Since its inception in 1984, the Foundation's 72,000 members have helped generate more than $30 million to conserve and enhance 1.1 million acres of wildlife habitat. The RMEF is headquartered in Missoula, Montana.—*Rocky Mountain Elk Foundation*

## Catch-and-Release Techniques Help Trout Survive

Catch-and-release is the law on some streams, yet many anglers have become so hooked on the technique they actually enjoy returning trout to the stream.



If you intend to release trout, it's best to use artificial flies or lures, but even bait anglers can release fish.

There are five steps you can learn to help released trout survive. How you play the trout, how you land it, how you handle it, how you remove the hook, and how you revive it play important roles in released-trout survival.

### Playing Your Trout

•Play the trout as rapidly as possible—do not play it to total exhaustion. A trout that is played to exhaustion may not survive. Although a light rod and leader offers exciting sport, it is best to use a rod, line, and leader of sufficient strength to easily land trout you intend to release.

### Landing Your Trout

•When you are about to land a trout, try to keep it immersed in water. Do not let the trout flop on rocks in shallow water and never let it flop on dry land. By keeping the trout in water as long as possible when handling and removing a hook, you increase the likelihood that it will survive to be caught again.

### Handling Your Trout

•Use soft, wet gloves—or at least wet your hands—to handle a trout. A trout's skin is scattered with sensory organs and nerve endings. The sensory organs augment its ability to taste and smell, while the nerve endings seem to be used to hear and detect vibrations. The slimy sheen that coats a trout's skin protects these organs and nerve endings from bacteria and disease.

•Because pressure against a vital organ may prove fatal, cradle the trout gently with two hands, one supporting the belly and the other hand just underneath the tail.

•Keep your fingers away from the gills. Gills are delicate and full of blood vessels and injured gills are especially susceptible to disease. A trout bleeding from the gills has little chance of survival.

•To release your trout from a boat, don't lift it out of the water. A trout can be severely injured when lifted out of the water or when flopping in the boat.

•To photograph your catch, have a camera ready and do it quickly. Get your friend to snap the photo, or to hold the trout. If possible, keep the trout in the water by cradling it or by keeping it in a net.

### Removing the Hook

•Always try to remove the hook quickly and gently. While keeping the trout underwater, firmly grasp the hook with your fingers, long-nosed pliers, or hemostat, then roll or back the hook out of the trout's mouth. Most of the time, you won't have to

touch the trout.

•Sometimes, gently turning the trout upside down in the water seems to have a calming effect on the fish, which can make hook removal quick and easy.

•A lot of the struggle of hook removal can be avoided by removing the barbs from your hooks. A simple way to remove barbs is use pliers to press the barb flush against the shaft of the hook.

•When a trout is hooked deeply, which often happens when live bait is used, do not attempt to force or pull out the hook. Instead, cut the leader as close to the eye of the hook as possible and revive the fish. The hook will eventually rust away.

### Reviving and Releasing Your Trout

•If you must remove the trout from the stream, never throw or drop it back into the water. Instead, cradle it gently, well behind the gills, and lower it back into the stream.

•To revive an exhausted trout, point its head into the current until its gills are working and it maintains an upright position. In slow or still water some fish might need to be revived by "walking" them for a few minutes. To walk a trout, cradle it in the water, and gently move it back and forth. As the fish recuperates, you will see its gills begin to work.

•It may take several minutes to revive some trout. Large trout often require more time because their struggle to escape may have left them exhausted. As soon as the trout pulls against your hand, it should be immediately released.

Don't worry if the trout swims off slowly, if it pulls away on its own you can rest assured that you have done everything you could to help it survive.—*Tom Palmer, information officer, Conservation Education Division, Helena*

## Olympic Target Team Has Five Montanans

Five of the 11 shooters named recently to the new National Junior Olympic Running Target Team are from Montana.

The team's coach, Martin Edmondson, said members are eligible for a three-week training session in New Orleans in July.

He said that shooters were selected for the team on the basis of match results during the past year, including at the National Junior Olympic match in Colorado Springs, Colorado, in late March.

Montana members making the team are Andy Henckel of Park City, brother and sister Chad and Cathy Winstead of Belgrade, John Gray of Bozeman, and Hank Gray of Belgrade.

This year, Koby Holland of Dillon won the National Junior Olympic running target title.

Both Holland and Cody Voermans of Whitefish are members of the National Development Team, which is one rung above the Junior Olympic Team.—*Great Falls Tribune*

## Montana State Parks Calendar

**JULY**

**4—Fort Owen Day at Fort Owen State Park**
Ceremony and celebration to commemorate Montana's first permanent white settlement in 1841. A living history with skits, flag ceremony, and mint julep stand.

**10—Kids' Day at Spring Meadow State Park**
A special day of fun for children. Games, fishing clinic, entertainment, food, prizes, and more!

**17—Beaverhead Road Runners Fun Run/Gold Rush at Bannack State Park**
Participants may choose the 1.4 or 5.2 mile run. Registration begins at 8 a.m.

**17-18—Bannack Days at Bannack State Park**
History comes to life as characters from the past stroll the streets of Bannack amid medicine shows, shoot-outs, weavers, candle makers, and old-time musicians. Sample the kettle-cooked popcorn or eat a hearty meal served in the Old Meade Hotel.

**25—Seniors' Day at Spring Meadow State Park**
A special day of fun activities designed for our senior citizens. Music, entertainment, food, and prizes.

**31—Beach Olympics at Lake Elmo State Park**
Variety of fun and crazy sports events held on the beach of Lake Elmo. Activities include the keg toss, canoe race, water gun sharpshooters' contest, and paddleboat races.

**Garden Triathlon at Frenchtown Pond State Park**
Swim, bicycle, and run beginning and ending at the park. Exact date unknown, please call 542-5500 for details.

**AUGUST**

**7—Heritage Day at Canyon Ferry State Park**
A special day set aside to remember and enjoy our heritage. Numerous old-time crafts including spinning, butter churning, quilting, and others.

**20-22—Dinner Theater in the Park at Makoshika State Park**
"Pitchfork" fondue dinner and a short play in the park. A real treat!

**SEPTEMBER**

**6-10—Native American Awareness Week at Chief Plenty Coups State Park**
Various activities for all ages focusing on Native American culture, history, and dress.

# CONTRIBUTORS

As coordinator and zoologist with the Montana Natural Heritage Program in Helena, **DAVE GENTER** works with a variety of rare plants and animals. In recent years, he's done extensive research on harlequin ducks. It shouldn't be surprising if most Montanans haven't heard of the harlequin, says Genter, since it's rarely seen even by avid bird enthusiasts. Turn to page 2 for an entertaining portrait, in words and photos, of Montana's "Whitewater Wonder."

**DEBBIE CHEEK** is field support supervisor for the Parks Division at FW&P headquarters in Helena. In "Art for the Parks" beginning on page 8, she introduces the winners of this year's State Parks Poster Contest for fifth grade students. The winning posters, chosen in April by a panel of five judges, will be on display at department headquarters through summer and early fall.

Wall Creek Wildlife Management Area near Ennis has been called "a practical solution for managing both livestock and elk on the same piece of ground." In this installment of our "Lands Legacy" series (page 15), Region 3 (Bozeman) information officer **BERNIE KUNTZ** describes one of the most important elk winter ranges in southwestern Montana. In 1960, says Kuntz, the year the department bought the 6,149-acre unit, only about 250 head of elk wintered on the land. Today, thanks to a creative grazing system, about 1,500 elk winter there.

**DR. ERICK GREENE,** assistant professor in the Division of Biological Sciences at the University of Montana, has an ear for music. In fact, he's a jazz aficionado. So maybe it's only natural that one of his research interests involves distinguishing the songs of individual birds. As he asserts in his article on lazuli buntings beginning on page 19, "these differences in songs are just as stunning as the differences in plumages, and perhaps they play the more important role in the acoustic world of buntings." The story includes a colorful illustration by **JOHN MUIR LAWS,** a graduate student at UM who assists in Dr. Greene's bunting research.

Swimmer's itch (page 24) isn't what you have on a hot summer day when you have a yen to immerse yourself in cool water. But it's what you may *get* after a trip to some Montana waters, especially Flathead Lake. Given the prevalence of questions and misinformation concerning swimmer's itch, **CRAIG SPENCER** and **BRENT LOKEN** decided to do some research on the problem. It turns out that swimmer's itch is caused by a tiny parasitic worm whose life cycle involves waterfowl and snails. As they tell us, "the red spots and itching disappear in about a week with no lasting ill effects, so it's more of a nuisance than a serious health problem." Spencer is an assistant professor of biology at Augustana College in South Dakota who spent five years on the faculty at the Flathead Lake Biological Station. Loken is a biology student at Augustana who studied swimmer's itch on several lakes in Michigan.

"Deep Blood Kettle" (page 27) may be a sinister-sounding title for an *MO* article, but **BRUCE AUCHLY'S** story is anything but sinister. It's a fascinating account of archaeological research being done at Ulm Pishkun State Park near Great Falls—research that is revealing new information about the early inhabitants of the area and their dependence on bison. "Pishkun" apparently comes from a Blackfeet word meaning "deep blood kettle"—a precipice used by prehistoric people for the stampeding and killing of buffalo. Auchly is the department's information officer in Region 4 (Great Falls).

As research assistant for the Elkhorn Mountains elk research project, biologist **JOHN VORE** sees lots of elk. But as he explains in his article starting on page 33, "seeing *those* bulls was a special treat." It was during an aerial census of elk winter range in the Elkhorns in winter of 1991/92, and the 31 bulls in the group all had branched antlers. According to Vore, mature bulls in the Elkhorns were almost nonexistent prior to a new season restricting harvest of branch-antlered bulls.

*MO* thanks the following photographers and artists for their contributions to this issue: **JOHN ASHLEY**, Missoula; **MICHAEL J. BARLOW**, Bozeman; **ERICK GREENE**, Missoula; **RALPH KRIEG**, Helena; **JOHN MUIR LAWS**, Missoula; **MEDIA WORKS**, Bozeman; **LEE RENTZ**, Shelton, Washington; **TOM J. ULRICH**, West Glacier; and **JOHN WINNIE, JR.**, Kila. Thanks also to the following contributors who work for the department: **KURT ALT**, **FRED KING**, and **BERNIE KUNTZ**, Bozeman; **BRUCE AUCHLY**, **LUCILLE LUNDIN**, and **DAN B. SMITH**, Great Falls; and **RICH DESIMONE** and **JOHN VORE**, Helena.

# Room With a View

## Wall Creek Wildlife Management Area

by BERNIE KUNTZ

IF YOU TAKE HIGHWAY 287 south out of Ennis, Montana, and drive up the Madison River, you will soon cross Indian Creek. To the east rise the rugged peaks of the Madison Range, and to the west lies the Gravelly Range. If you look westward to the benchlands and foothills just beyond the river, you will see the Wall Creek Wildlife Management Area (WMA), one of the most important elk winter ranges in southwestern Montana.

Wall Creek WMA and the Wall Creek Grazing Allotment has been called a practical solution for managing both livestock and elk on the same piece of ground. It also has been called one of the West's finest examples of practical application of a grazing system that takes care of the needs of elk *and* livestock.

The WMA has won a plethora of awards for its exemplary grazing system. Last year, the Montana Department of Fish, Wildlife & Parks (FW&P), the Madison Ranger District of the Beaverhead National Forest, the Bureau of Land Management, and the seven-member Wall Creek Grazing Association received a "Special Merit Award" from the National Environmental Awards Council. The Council is a coalition of 28 national environmental organizations that honors organizations for "success in protecting the environment, inspiring others to take environmental action, and reaching community goals."

Records show that in 1935 only a half-dozen elk wintered on what is now the Wall Creek WMA. By 1960 about 250 head of elk

FRED KING

*The Wall Creek WMA supports about 1,500 wintering elk that make good use of the rich grasses above the Madison River.*

wintered on the land. That was the year the department bought the 6,149-acre unit at a cost of $790,000, or about $128 an acre. (As part of the unit, FW&P also leases 918 acres of state land at an annual cost of about $742.) The department did not allow any livestock grazing on the WMA for more then 20 years. Meanwhile, the seven ranchers who make up the Wall Creek Grazing Association ran cattle on the Beaverhead National Forest in the Gravelly Mountains above the WMA.

This arrangement had unintended consequences. Elk were feeding heavily on neighboring private lands, and not using portions of the WMA as much as FW&P biologists wished. So, in 1980, FW&P managers, ranchers, and U.S. Forest Service representatives met and came up with a program that coordinated management of the Wall Creek area regardless of ownership. The program was established to meet the following objectives:

• Maintain and enhance the soil and vegetative resource.

• Provide high-quality winter forage for elk thoughout the winter range regardless of ownership.

• Alleviate game damage conflicts on private lands by enhancing desirablility of the Wall Creek WMA.

• Provide spring, summer, and fall cattle grazing.

To say the least, the move was controversial.

DURING THE 1980s, a 10-pasture rest-rotation system was set up complete with removable electric fences, and today the WMA supports about 700 head of domestic livestock. FW&P workers had to build six miles of interior fences and add two water developments. The fence is a three-strand, high-tensile electric model that can be completely taken down during winter to allow elk unrestricted movement. Today, Wall Creek WMA supports 1,400 to 1,500 wintering elk that make good use of the rich grasses above the Madison River.

According to a report on the WMA entitled "Coordinated Management of Elk and Cattle, a Perspective," the system works like this:

> In any given year, one set of three pastures is grazed by moving cattle up in elevation during the growing period, one set is grazed by moving cattle down in elevation during the post-seed ripe period, and the third set is rested. Over a three-year period, a given set of three pastures will be grazed during the growing season in year one, grazed post-seed ripe in year two, and totally rested in year three.
>
> Under this system, following a grazing treatment during the growing season, two years of vegetative rest are provided with one of these being a year of total rest from livestock use.
>
> Each year, cattle first enter one of the low-elevation elk winter range pastures on May 1, where they remain for one month. On June 1, which corresponds to the period of rapid plant growth (boot stage), they are moved to the mid-eleva-

tion elk winter range pasture where they spend six weeks. On July 15, they are moved to a high-elevation pasture until seed ripe. Following seed ripe (mid-August) cattle are moved to a second high-elevation pasture where they remain until September 15. On September 15 cattle are moved down slope into a mid-elevation elk winter range pasture and then into a low-elevation winter range pasture, spending one week in each. On September 30, cattle are moved off the area to Wall Creek Grazing Association private lands where they spend the winter months.

Management benefits can be simply stated as follows:

• Presently, approximately 80% to 90% of the vegetation produced on the six winter range pastures is available to wintering elk.

• At any one time, three of the four summer range pastures are available for elk use without the presence of cattle.

• Periodic removal of residual accumulation of past years' plant growth has increased the palatability to elk of species such as smooth brome and crested wheatgrass.

• Members of the Wall Creek Grazing Association receive an additional month of livestock grazing, which translates into an increase of 826 animal unit months (AUMs) of grazing.

• The grazing system has resulted in better understanding and a closer working relationship between FW&P biologists, agricultural producers, Beaverhead National Forest managers, and the public.

"The system is designed around the physiological requirements of the bunchgrass community," says FW&P biologist Kurt Alt, who is responsible for the overall management program on the Wall Creek WMA. "This system gives bunchgrass a chance to store energy in its root system, allows for seed production two out of every three years, and provides for seedling establishment during the year of rest."

Alt emphasizes that each year under this grazing program approximately 70% of the range provides substantial residual cover for nongame species such as songbirds and small mammals. "Every WMA the department has purchased has benefited a whole host of wildlife species, including big game, small game, nongame, and in many instances fisheries," he says. "It was all done with hunter license dollars."

GRAPHIC BY KURT ALT AND MEDIA WORKS

*In any given year, one set of three pastures is grazed by moving cattle up in elevation during the growing period, one set is grazed by moving cattle down in elevation during the post-seed ripe period, and the third set is rested. Removable electric fences are used to confine cattle to designated pastures during summer.*

FRED KING

Alt points out that most of Montana's land is in private ownership, and that agriculture is still the No. 1 industry in the state. "For this reason the Wall Creek grazing program provides a reasonable example to the agricultural community and the hunting and nonhunting public that shows how elk and cattle grazing can be compatible on the same piece of ground."

FRED KING, THE DEPARTMENT'S wildlife area manager for Region Three, is responsible for eight wildlife management areas in southwestern Montana, totaling some 135,000 acres. He says the intent of the grazing program at Wall Creek WMA is to take care of the basic needs of soil and vegetation.

King explains that the Wall Creek grazing program is designed to make sure that no matter where elk are wintering, whether it be on the game range or on adjacent Forest Service pastures, "there will be a decent amount of quality forage available for them to get through the winter."

As we bounce along the road paralleling the Madison River, King points to houses recently built on bluffs along the east side of the river. "Once the area becomes subdivided into 20-acre parcels, it is lost as wildlife habitat and also as grazing land," he says. "The land within Wall Creek WMA would make prime building sites, and it likely would have been subdivided by now had the department not acquired it. That has been the trend in the upper Madison drainage."

King points out some of the "spinoff benefits," as he calls them, of FW&P ownership of the land at Wall Creek:

• Public access to adjacent Forest Service lands.

• Elimination of game depredation problems.

• Habitat improvement through improved vegetation.

• Increases in recreational opportunity for hunters and nonhunters.

• Elimination of housing developments.

As with most of the department's WMAs, Wall Creek is closed to all recreational activity from December 1 to May 15 to prevent displacement of wintering elk and mule deer onto adjacent private lands. "That builds in some visual security," King says. "The elk know they aren't going to be disturbed during the winter months, and they are showing up in places on the unit where we never saw them before. There are more elk, and they are using all portions of the game range."

King is enthusiastic about the eight winter ranges he maintains, particularly Wall Creek WMA. "One of the natural resources that Montana has had, and one that has been sadly taken for granted, overlooked, and forgotten about is the spacial quality of Montana. The ability for wild animals to survive in Montana's harsh climate is reflected in their ability to move, change feeding locations, migrate, and make use of big, open space. If you eliminate those options of movement by taking away that space, you take away an animal's options for survival."

King stresses that while the department's WMAs were initially purchased solely for providing high-quality vegetation for wintering animals, they have inadvertently preserved open space in the face of a frenzy of subdivision development.

"The game range programs have been our opportunity to buy land with hunter license dollars. Today they represent a reinvestment of money generated from hunting licenses, which are renewable resources, and we plow the investment back into the basic resources of soil, vegetation, and space. Don't forget that all-important space. It is a cycle that can go on indefinitely." That, along with perpetuating an elk herd and a whole host of wildlife species, is what Wall Creek WMA is all about. ■

# Wall Creek Wildlife Management Area

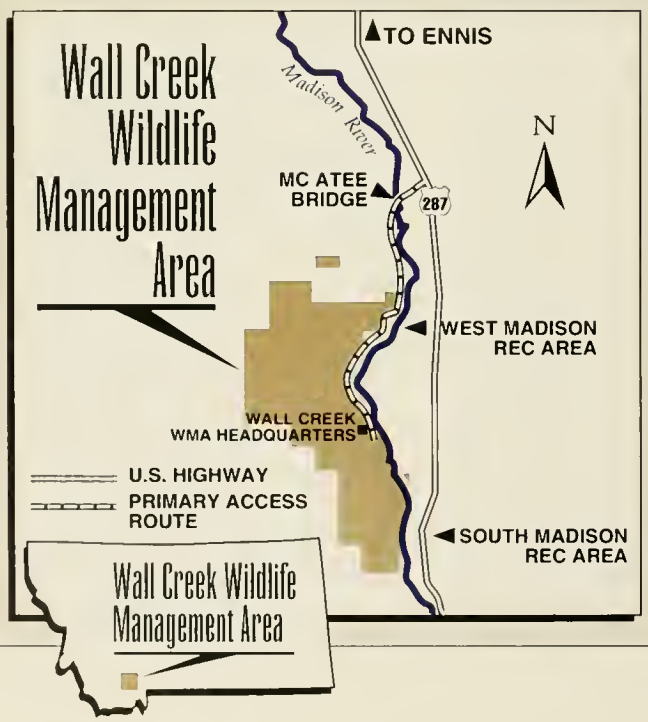
*The primary goal of Wall Creek WMA is to provide year-round habitat for wildlife as well as a variety of recreational activities.*

DAVE BOOKS

**Location:** In Madison County approximately 35 miles south of Ennis, along the east face of the Gravelly Range.

**Size:** 7,067 acres.

**Acquisition date:** 1960.




**Access:** Take U.S. Highway 287 south from Ennis for 35 miles to the McAtee Bridge turnoff, cross the Madison River, then turn south and proceed five miles to Wall Creek WMA headquarters.

**Management goal:** To provide year-round habitat for wildlife, emphasizing elk winter range, and to provide a variety of public outdoor recreational opportunities.

**Hunting opportunities:** Archery and rifle hunting seasons for elk, mule deer, white-tailed deer, moose, antelope, and black bear are open to licensed hunters. Limited opportunities also exist for upland gamebird hunting.

**Fishing opportunities:** Wall Creek WMA provides public fishing access to the upper Madison River.

**Wildlife viewing:** Winter presents the best opportunities for viewing elk and mule deer (although the WMA is closed to recreational activity between December 1 and May 15, deer and elk can be observed from Highway 287). Antelope and black bear can be seen in spring, summer, and fall, as can a variety of raptors, small mammals, and songbirds. The Madison River is a major migration corridor for Canada and snow geese, ducks, loons, swans, and sandhill cranes. Furbearers such as beaver, muskrat, mink, and river otter can be seen along the river and its tributaries.

# Gem of the Bird World

by ERICK GREENE
illustrations by JOHN MUIR LAWS

ONE MORNING THIS MAY on the outskirts of Missoula, I stood next to a ravine filled with serviceberry trees and ninebark shrubs. Although rufous-sided towhees, chipping sparrows, and Nashville warblers were all busy singing, to my ears it was strangely quiet. A sound was missing that I have come to associate with brushy, scrubby habitat in Montana.

ERICK GREENE

*"With their electric blue heads and backs, russet breast bands, and immaculate white stomachs, these gaudy little birds resemble bluebirds that have shrunk in the wash."*

That night was clear and calm, and at midnight I ventured out on my back porch and held my breath. From far overhead came the faint chips of migrating flocks, heading north using Polaris and constellations as navigation signposts. I knew the ravine would be a very different place in the morning. Sure enough, the next day the air rang with a sound that had been absent the day before: sweet warbling songs interspersed with nasal buzzes and beeps. Lazuli buntings had come back to Montana for another spring.

Appropriately named after the beautiful blue gemstone called lapis lazuli (from Latin meaning "azure stone"), lazuli buntings (*Passerina amoena*) are common spring and summer birds along creeks and rivers and in scrubby habitats throughout the western United States. The bright-colored males are easy to spot perched in the tops of bushes and small trees, and even easier to locate by their sweet warbling song. With their electric blue heads and backs, russet breast bands, and immaculate white stomachs, these gaudy little birds resemble bluebirds that have shrunk in the wash.

In recent years my students and I have studied lazuli buntings on Mount Sentinel, directly behind the University of Montana in Missoula. We have been particularly interested in documenting the behavioral differences among individual birds. It has only been fairly recently that wildlife biologists have devised techniques that allow them to identify and study wild animals as individuals. These techniques have revealed a previously unimagined complexity in the social behavior and ecology of wild animals. An excerpt from a recent book about dunnocks (sparrow-like European birds) by N. B. Davies suggests some of the ways our understanding of animal behavior changes when we can identify individuals:

> "Unobtrusive, quiet and retiring, without being shy, humble and homely in its deportment and habits, sober and unpretending in its dress, while still neat and graceful, the dunnock exhibits a pattern which many of a higher grade might imitate, with advantage to themselves and benefit to others through an improved example." With these carefully chosen words, the Reverend F. O. Morris (1856) encouraged his parishioners to emulate the humble life of the dunnock, or hedge sparrow *Prunella modularis*....A change in focus from casual observation of the species to detailed recording of the lives of individuals reveals that this Garden of Eden view of dunnock life is very much mistaken. The Reverend Morris's recommendation turns out to be unfortunate: we now know that the dunnock belies its dull appearance, having bizarre sexual behaviour and an extraordinarily variable mating system. Had his congregation followed suit, there would have been chaos in the parish and the Reverend Morris's devotion to ornithology and the writing of his "A History of British Birds" would have been severely disrupted.

Although lazuli buntings are considerably showier than dunnocks, it turns out that in many respects individual buntings are as different as individual people. We have come to know each bird as an individual, to recognize its haunts and habits, its quirks, and its character. We are only beginning to recognize animals as individuals, but this relatively new focus has some important implications for appreciating and protecting our natural heritage.

Since we humans normally have a hard time distinguishing individual animals in the wild, the key is to have some way of recognizing them. For birds, that key is called color banding. We are able to capture male buntings by making use of their strong territorial instincts during the breeding season. Once we know where a male has staked out his turf, we select two low bushes near the middle of his territory. We hide a small speaker in each bush, and place a nearly invisible net between the bushes. From a nearby hiding place, we play a tape-recorded song of a bunting from the speaker nearest the male bunting we are trying to catch. This mimics a territorial intrusion by a strange male bunting, and this insult is not taken lightly by the resident male. He immediately flies in to investigate the outrage. We then play the next song from the speaker on the other side of the net, so that it sounds like the intruder is flying away. The resident male continues the chase, and if we have placed our mist net properly, we have caught ourselves a bunting.

The captured bunting is quickly untangled from the net, photographed, measured, and most importantly, outfitted with a unique combination of colored leg bands. The bird is released none the worse for wear, and usually flies to the top of a nearby tree and continues singing. The color bands allow us to identify that bird for the rest of its life.

One of the most striking differences between individual males involves the coloration pattern of their plumage. Lazuli buntings exhibit what ornithologists call "delayed plumage maturation," which is a fancy way of saying that males tend to get brighter as they get older. Yearling males tend to have considerable amounts of rusty brown among the blue feathers on their

*Yearling male lazuli buntings (lower illustration) have considerable amounts of rusty brown among the blue feathers on the head, back, rump, and wing patches, and thus appear fairly dull and mottled. Males that are 2 years old or older (upper illustration) are extremely bright and gaudy; they have few brown feathers mixed in with the blue, and their wing patches tend to be ivory white.*

ILLUSTRATIONS BY JOHN MUIR LAWS

heads, back, rump, and wing patches. This makes these young males appear fairly dull and mottled. In contrast, males that are two or older have very few brown feathers mixed in with the blue, and their wing patches tend to be ivory white. These older males appear extremely bright and gaudy.

In addition to this systematic variation in plumage associated with age, there is also considerable variation within age classes. The next time you are out in suitable habitat, see if you can find two dull male buntings (yearlings), or two bright birds (two years or older). A careful comparison of the plumages of the two birds through your binoculars will almost certainly reveal some obvious differences between them: this one has a thinner breast band, that one has a large brown spot on the left side of its head, that one has more brown on its wings, and so on.

ANOTHER MAJOR DIFFERENCE among individual males is in their songs. This difference is harder for us to detect than plumage variation, because our ability to process sound is downright lousy when compared with other animals such as most songbirds. However, these differences in songs are just as stunning as the differences in plumages, and perhaps they play the more important role in the acoustic world of buntings.

We record the songs of all the birds on our study site, and with the aid of computers produce "sonograms" that help us visualize the songs. Sonograms are simply graphical representations of sound, and they are very similar to musical notation: pitch is shown on the vertical axis (with higher sounds being up and lower sounds being down), and time is shown along the horizontal axis.

The thickness of lines also conveys information about the "quality" and timbre of the sound. For example, thin lines represent "sweet" and "pure" sounds (such as a tuning fork); thicker or multiple lines represent more "complex" or "richer" sounds (such as a human voice); rapid squiggles are buzzes and trills. With a little practice, you can very quickly learn to read a sonogram, so that just by looking at one you have a good idea of how a bird's call will sound to you.

Figure 1 shows the sonograms of four different male lazuli buntings on Mount Sentinel. You can notice immediately that the songs of these males are very different, and that they share very few syllables. In essence, each male's song is an acoustic fingerprint. If you were to give me a recording of one song of a bird from Mount Sentinel, with the help of the computer I could tell you exactly which bird it is.

Even without a computer, however, you can begin to appreciate these differences. Next time you find yourself listening to several male buntings singing, the first thing to do is close your eyes. This is because, being a very visual species, we tend to let our sense of vision overwhelm all of our other senses. Now listen carefully to the males as they countersing back and forth. Is one song consistently shorter than the other? Does one song have a distinctive upward slur near the beginning? Does the other song have a hallmark sequence of nasal buzzes and beeps? Within five minutes you might be able to start to tell these birds apart just on the basis of their songs. The next time you visit that spot, I guarantee that you will greet these different birds as old friends!

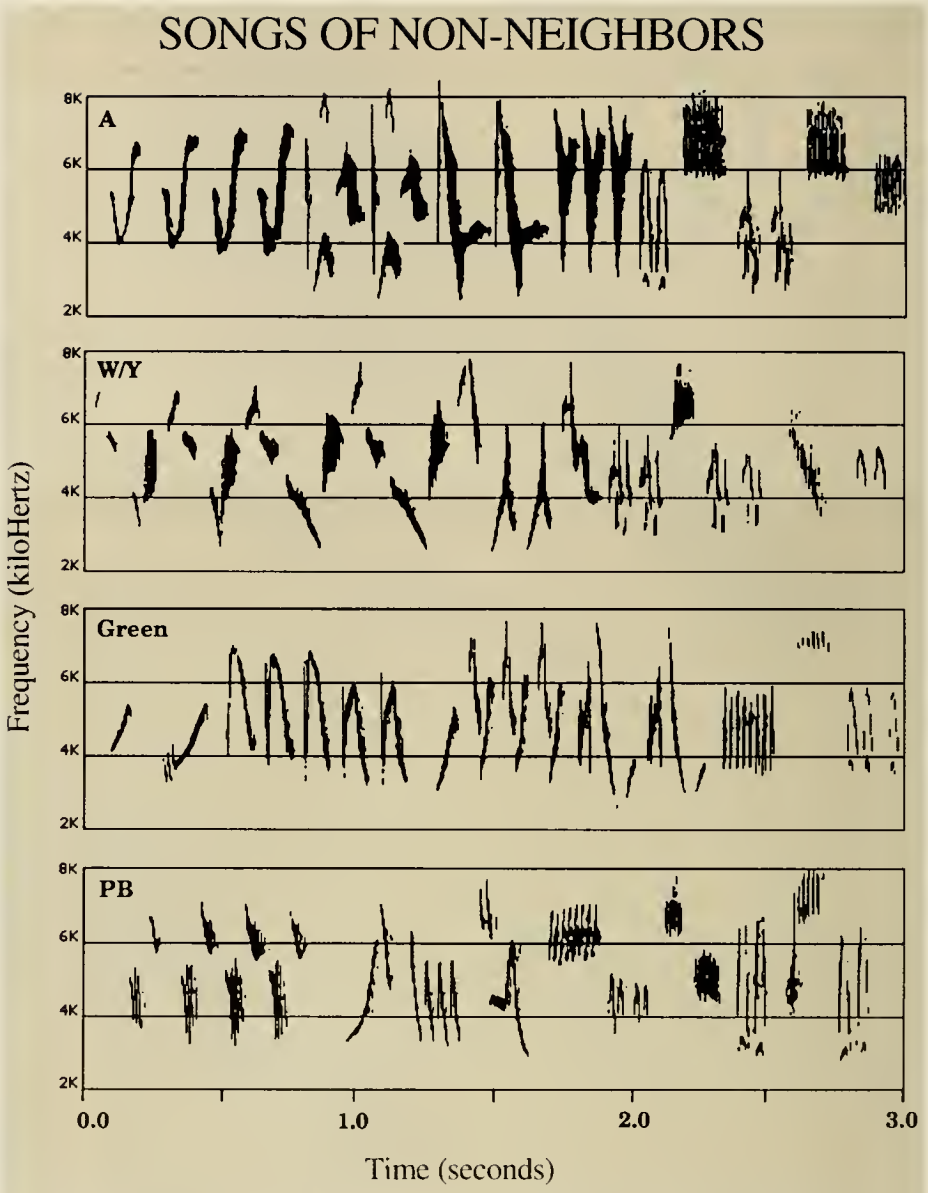



*Figure 1—Shown here are the "sonograms" of four different male lazuli buntings on Mount Sentinel near Missoula (sonograms are simply graphical representations of sound). Notice that the four songs are very different; because the territories of these birds were far apart, they could not hear each other singing.*

Even though each male bunting sings its own unique form of acoustic advertising, lazuli buntings have song dialects. Even on the small scale of Mount Sentinel, which is only about a mile long end to end, there are pockets of birds which sing with the same "drawl." Just as we have no difficulty recognizing a Texas drawl or Maine twang, lazuli buntings just as surely announce that they are one of those "golf course" birds, or one of the "north end" birds. In figure 1, I showed the songs of four birds whose territories were far apart, and consequently could not hear each other singing. Figure 2 shows an example of a song micro-dialect. These birds had adjacent territories, and thus could hear each other singing. Notice that even though the songs of these neighbors are much more similar than the songs of the non-neighbors shown in figure 1, each bird's song does differ in some way from the others.

How do these song dialects develop? The answer seems to be the result of several facts of bunting biology. Old males sing the same, crystallized song year after year, and they return to the same territories each year. In contrast, when yearling males first return to the breeding grounds, they have not yet settled on "their" song. They sing variable and uncrystallized songs, and they incorporate bits and pieces of the songs of nearby older birds.

By the end of their first year, the yearlings' songs resemble those of their acoustic neighborhood. Thus, the phenomenon of song dialects is really the result of social learning and cultural transmission of songs. These song dialects tend to be stable over long periods, since the younger birds return to the same territories in subsequent years, and then become the social tutors for the new yearling males that establish territories near them.

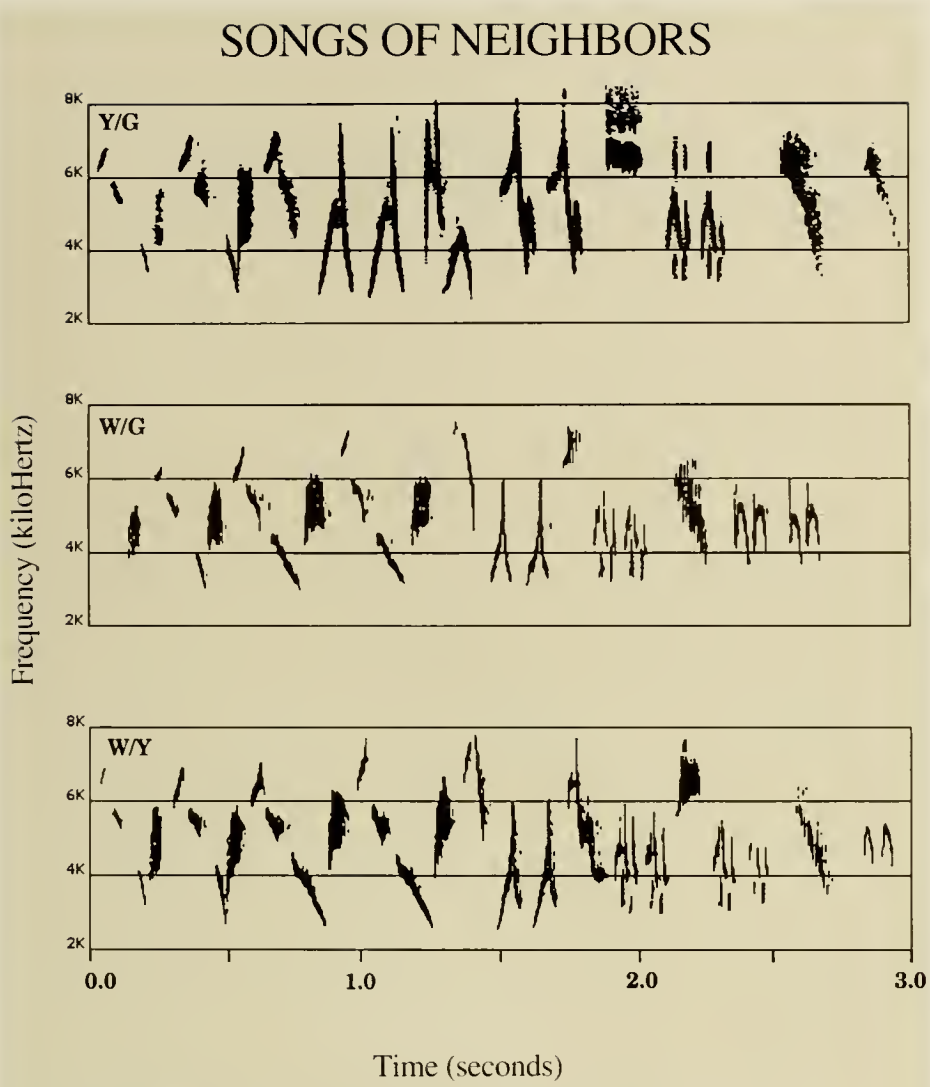



*Figure 2—Shown here are the sonograms of three male lazuli buntings whose territories were adjacent, and thus could hear each other singing. Notice that even though the songs of these neighbors are much more similar than those of the non-neighbors shown in figure 1, each bird's song does differ in some way from the others.*

WHAT ABOUT FEMALE buntings? So far I have only mentioned males—surely the females must play an important role in all of this. Female buntings are much more difficult to study since they do not sing (although they make a variety of quiet chips and buzzes), they are harder to see (they are olive brown with only the most subtle bluish tinge only visible at close range), and they spend most of their time concealed in thickets and bushes. But females are very picky about their choice of mates, and this choosiness has undoubtedly played an important role in the elaborate songs and plumages of the males jousting for their attention.

Although we are just starting to identify the exact cues that females might use when selecting a mate, it is clear that females find some males more attractive as potential mates than others. Last year, we suspected that one particularly successful male mated with at least four different females, while some of his neighbors sang all summer long without attracting a mate. It is also interesting to note that young males seem to recognize which of the older males the females find attractive. The young birds are much more likely to copy the songs of the "big man on campus," rather than "the 98-lb. weaklings" of the bunting world who experience lower reproductive success.

STUDIES OF WILD, free-living animals continue to reveal an astounding level of variation in behavior and reproductive success among individuals. These studies provide valuable views into the behavior and ecology of these species, and they can vastly increase our appreciation and enjoyment of the natural world all around us. But just as important, these sorts of studies also provide insights that may be helpful in preserving the long-term health and persistence of wildlife populations.

For example, many songbirds that breed in the northern hemisphere and spend the winter in Central or South America have been declining at alarming rates. Lazuli buntings, while not declining as precipitously as some species, seem to be showing a downward trend over much of their range. Since they spend the winter in scrubby, second-growth areas in Mexico, it is unlikely that tropical deforestation is the culprit. This raises the concern that problems on the breeding grounds, such as cowbird parasitism (cowbirds laying eggs in nests of other species) or nest predation, may be contributing to population declines. Careful studies of the behavior, ecology, habitat requirements, and reproductive success of individuals provide important information that can help us protect and conserve the wildlife gems that enrich the natural world.

*If you would like to listen to slowed-down songs while you look at the sonograms shown in figures 1 and 2, you can obtain a cassette tape with more information on what to listen for and how to use sonograms by sending $3.00 to: Dr. Erick Greene, Division of Biological Sciences, University of Montana, Missoula, MT 59812.*

# Scratching for Answers

by Craig Spencer and Brent Loken

Imagine looking forward to a family vacation on beautiful Flathead Lake. Then, after only one day of frolicking in the water, the kids become covered with itchy red spots. They begin to scratch in hopes of relieving the maddening irritation. Repeated swimming in the lake produces more symptoms. It's called swimmer's itch, and some people think it's getting worse.

Not everyone who swims in Flathead Lake gets swimmer's itch, of course. Its incidence varies from place to place in the lake, and some people seem immune to it. The red spots and itching disappear in about a week with no lasting ill effects, so it's more of a nuisance than a serious health problem. But all things considered, it's something you'd rather not have.

What causes it? Talk to 10 different people, and you're likely to get 10 different answers. Recent comments heard around Flathead Lake include:

• *It's the shrimp. Swimmer's itch was never a big problem until those darn Mysis shrimp were introduced into Flathead Lake.*

• *I think it's caused by pollution of the lake.*

• *It's the seagulls. Ever since they moved the Lake County landfill closer to the lake, down by Polson, seagulls have been flocking to the area to feed and bringing swimmer's itch with them.*

• *What's all the fuss? I've been swimming in Flathead Lake all my life and have never gotten it.*

• *It's the geese. We never had geese like this in our yard before. They're all over now, messing up my dock and front lawn.*

• *If it turns out to be the geese, that's the last thing I want to hear. We've been working hard for the last 10 years to reestablish populations in the Flathead and are finally having some success!*

Given the prevalence of questions and misinformation concerning swimmer's itch, we decided to conduct some research ourselves on the problem in Flathead Lake, and to share this information with the public. We thank the Flathead Lakers, the Lake County Health Department and County Commissioners, and Augustana College for providing funds to help support this research.

It turns out that scientists have been studying swimmer's itch since the early 1900s and quite a bit is known about it. Swimmer's itch is caused by a tiny parasitic worm, a member of the group of flatworms called flukes. Hunters may have encountered flukes when cutting up the livers of various big game animals, but these flukes are much larger than the kind responsible for swimmer's itch.

More than a dozen species of flukes can cause swimmer's itch, and all of them share a similar life cycle (see figure). To survive, the parasite must spend a portion of its life inside a waterfowl host, and another portion inside a snail host. The word "host" does not imply a welcoming, friendly interaction. Rather, it is used in biology to describe an organism that harbors a parasite.

The swimmer's itch cycle begins when adult flukes, which reside in the intestinal wall of a waterfowl host, lay eggs that migrate into the intestinal tract of the bird. These eggs pass out of the bird with the feces. If the feces are deposited in water, the eggs quickly hatch into larvae called *miracidia*. These microscopic organisms immediately begin to search for a suitable snail host. There are many different kinds of snails, but only a small percentage serve as hosts for the swimmer's itch parasite. If infected waterfowl happen to deposit parasite eggs into a lake that does not have the proper snail species, the swimmer's itch life cycle ends without causing any human problems.

Once in the water, the miracidia have about 12 hours to find a suitable snail host, or they die. If a proper snail is found, the miracidia burrow through the "foot" of the snail (the soft, slimy part that protrudes from the shell) and into the snail's gut. Once safely lodged in the gut, the miracidia develop into veritable cloning machines; within four to six weeks, they begin producing large numbers of microscopic larvae called *cercaria* that emerge from the snail into the lake.

Once in water, the cercaria have 12 to 24 hours to find a proper host, or they too will die. The typical hosts for cercaria are waterfowl. As with the snails, only certain species of waterfowl make accommodating hosts. When a host is located, the cercaria first attach themselves to the bird's skin with a large sucker (similar to that of a leech). The cercaria then burrow through the skin into the bloodstream, beginning a journey that will take them through the bird's lungs and liver and eventually to the intestinal tract. Here, the adult flukes produce eggs, and the whole intricate life cycle begins again.

The problem for humans comes when free-swimming cercaria mistake them for waterfowl hosts. If cercaria happen to encounter a human in the water, they burrow into the skin. Fortunately, the parasites are stopped short of entering the bloodstream by the human immune system. Unfortunately, the penetrating cercaria trigger an allergic skin reaction in the skin. Each red spot is the result of penetration by a cercaria worm. These red spots may persist for

a week or more. Eventually they disappear, producing no other ill effects. Repeated exposure to the parasite often increases the human allergic response. Like many other allergic responses, some people are extremely sensitive to the parasite, while others show little or no reaction.

The initial research on swimmer's itch at Flathead Lake began during the summer of 1991, when Dr. Bill Granath and Susan Varrelman from the University of Montana collected snails from various locations around the lake and identified two species infected with cercaria. The following summer, while working at the Flathead Lake Biological Station, we expanded on this effort to include study of the entire life cycle: from waterfowl, to snails, to humans.

Our first task was to identify the waterfowl species that carry the parasite on Flathead Lake. We were able to identify infected waterfowl through microscopic examination of fresh fecal material. This effort was facilitated by the typical behavior of ducks. When approached slowly by boat, perched birds frequently contributed to our research effort by depositing a fresh "sample" immediately prior to flying off. When we returned to the lab, we confirmed the presence of swimmer's itch by mixing the fecal samples with water, waiting a short time for any eggs to hatch, and then counting newly emerged miracidia with the aid of a microscope.

After examining hundreds of fecal samples from around the lake, the results were clear. The principal culprits were not Canada geese or seagulls as suspected by some local residents, but common merganser ducks. These birds, which are distributed throughout the lake, had a very high infection rate. Eighty-four percent of the common mergansers examined were infected with the swimmer's itch parasite. This compares with infection rates of only 4% and 1% for seagulls and Canada geese, respectively. Not only was the percentage of infected birds very low for these two species, but the few that carried the parasite were only lightly infected. Fecal samples from infected seagulls and Canada geese had 100 to 1,000 times fewer miracidia than those from infected mergansers.

Although other waterfowl species are found on Flathead Lake during the summer, they are much less abundant than the three species reported above. The few fecal samples we collected from mallards were not infected. From fall through spring, other waterfowl species such as redheads or coots may be found periodically in large numbers on Flathead Lake. We suspect these species play a minor role, if any, in the life cycle of swimmer's itch on Flathead Lake, because they are rarely present during summer when the parasite appears to be most active. Nevertheless, further research on this topic is warranted.

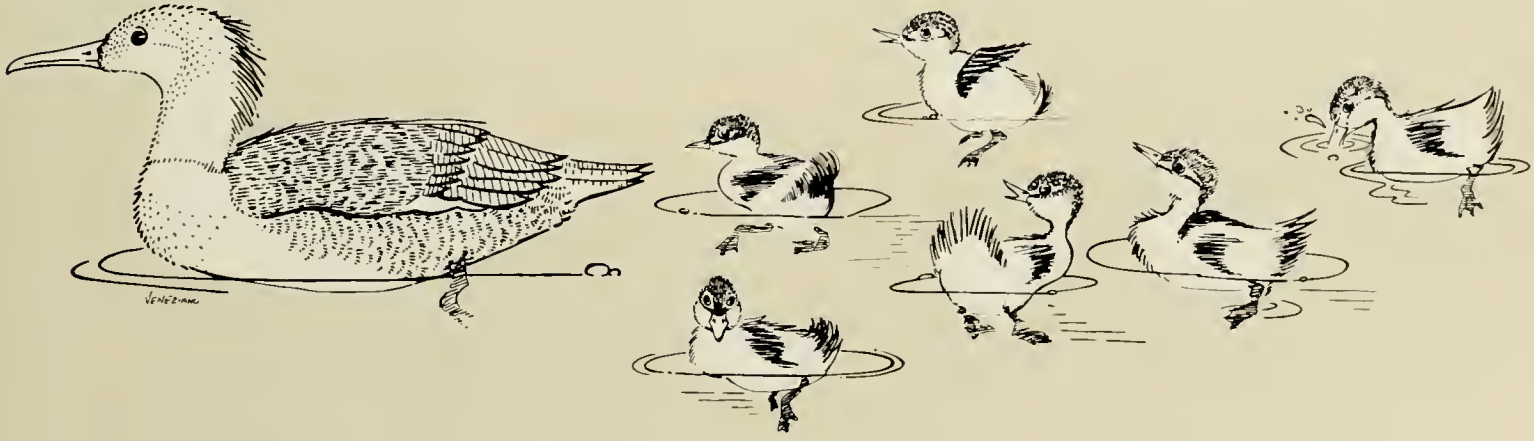
Previous studies by one of us (Brent) in association with Dr. Harvey Blankespoor from Hope College also revealed the common merganser as the primary waterfowl host for swimmer's itch in a number of lakes in Michigan. Given the high infection rates found on Flathead Lake, together with corroborating data from other studies, we feel confident in identifying the common merganser as the principal waterfowl host for the swimmer's itch parasite on Flathead Lake.

We next turned our attention to identifying the snails that carry the parasite. We collected snails from numerous locations around the lake, especially in areas where outbreaks of swimmer's itch are commonly reported. On our return to the lab, we placed live snails in clear plastic cups and incubated them under bright lights, stimulating them to "shed" cercaria. Each cup was then examined for the presence of cercaria.

We found five different types of cercaria in snails from Flathead Lake. Only some types of cercaria produce swimmer's itch in humans. The best way to determine which cercaria affect humans is to purposely spread the different types directly on human skin, and observe which ones produce a reaction. We are grateful to the many volunteers at the Biological Station who were willing to sacrifice their bodies for the advancement of science!

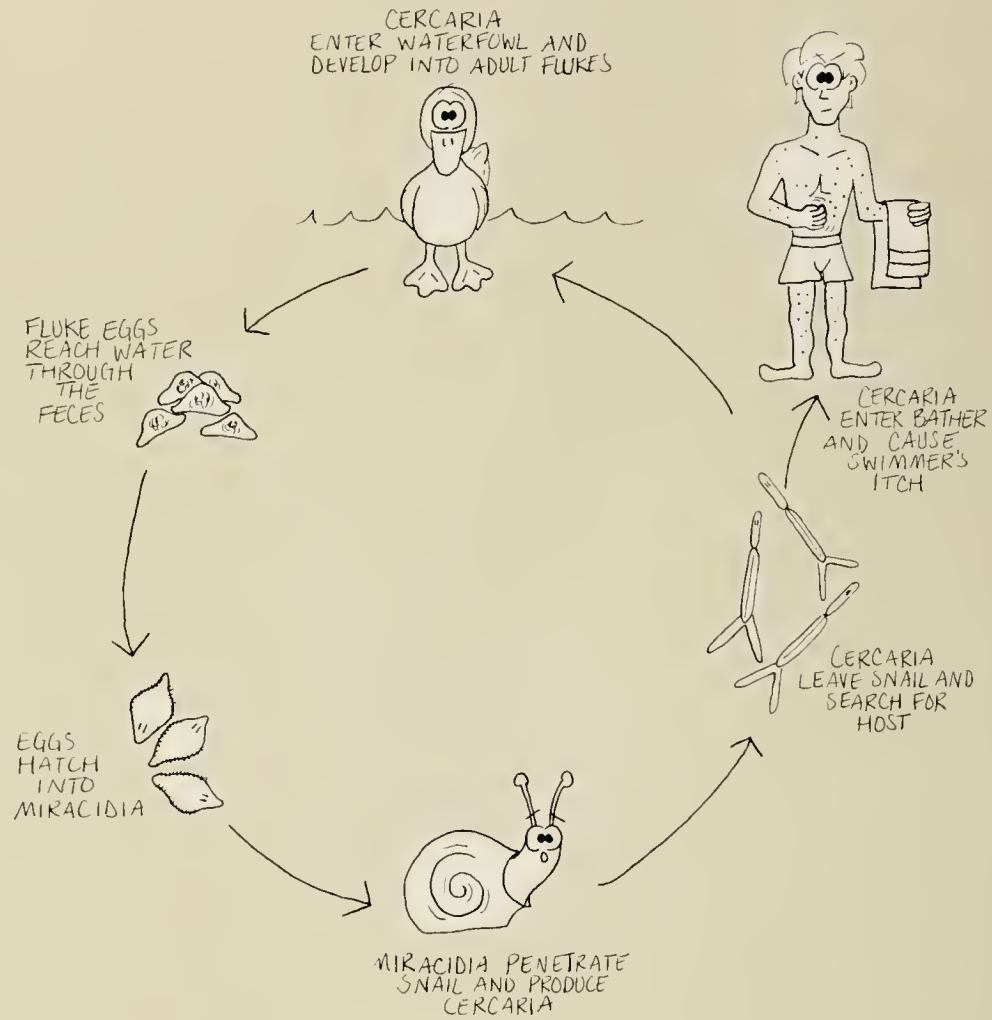
Of the five different cercaria found, only the fork-tailed, long-bodied variety produced a human allergic reaction. The predominant snail host for these cercaria was *Stagnicola elrodi*, the most common snail found in Flathead lake. Infected *Stagnicola elrodi* were found all around the lake, including every location we examined in response to a swimmer's itch complaint. Snail infection rates ranged from 1% to 5% depending on the location in the lake. Although these percentages may seem low, they are more than sufficient to cause swimmer's itch problems, since a single infected snail may release thousands of cercaria into the lake each day. Bill Granath also reported finding similar cercaria in a second kind of snail, *Physella*, in Flathead Lake. Although this snail is much less abundant, it too may contribute to the problem.

In June of 1992, we issued several press releases asking anyone getting swimmer's itch in Flathead Lake to contact the health department in Lake or Flathead county. From mid-June through late August, over 100 swimmer's itch reports from numerous locations around the lake were fielded by the health departments and the Biological Station. This widespread occurrence is not surprising



given the fact that the predominant parasite hosts (common merganser and *Stagnicola elrodi*) are found along the shoreline of the entire lake. Although swimmer's itch reports were received from many locations, these reports were often sporadic, and many areas were relatively free of the problem for extended periods during the summer.

Swimmer's itch has been reported on Flathead Lake for many years. The parasite and its primary hosts are almost certainly native to Flathead Lake. Nevertheless, long-term residents of Flathead Lake often complain that swimmer's itch is worse now than in the past, and frequently ask why. We suspect the primary culprit is increased growth of algae around the shoreline. Appearing as a slimy coating on rocks, logs, and docks, algae constitute the principal food of snails. Many residents report that growth of algae is much more noticeable now than in the past. With more food available, snails have likely become more abundant, providing more potential hosts for swimmer's itch. Ongoing research at the Biological Station has attributed increased growth of algae to human-related inputs of nutrients (phosphorus and nitrogen) into the lake (see *Montana Outdoors*, July/August 1986).


CERCARIA ENTER WATERFOWL AND DEVELOP INTO ADULT FLUKES
FLUKE EGGS REACH WATER THROUGH THE FECES
CERCARIA ENTER BATHER AND CAUSE SWIMMER'S ITCH
EGGS HATCH INTO MIRACIDIA
CERCARIA LEAVE SNAIL AND SEARCH FOR HOST
MIRACIDIA PENETRATE SNAIL AND PRODUCE CERCARIA

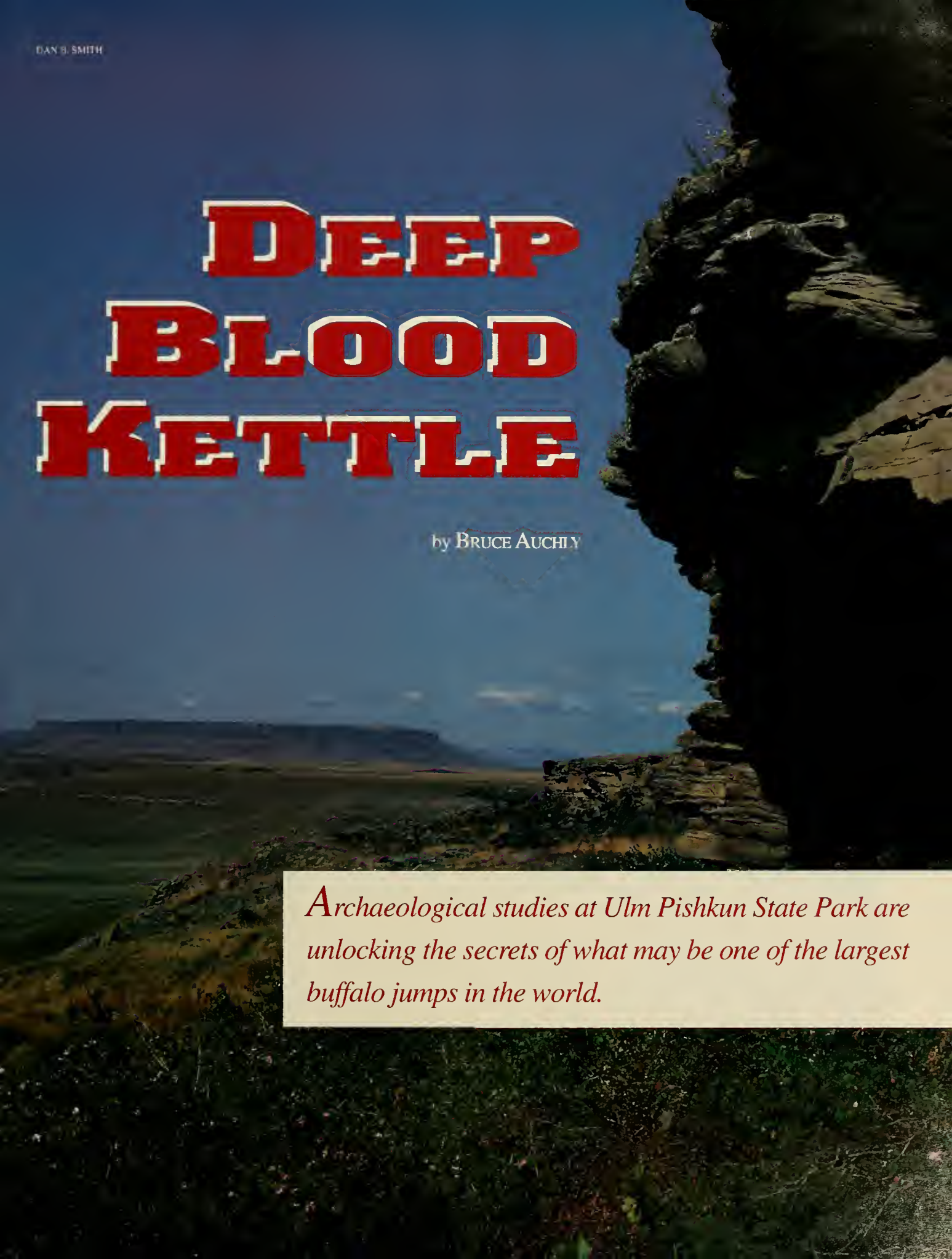
A second possible explanation for increased reports of swimmer's itch is that the number of humans using Flathead Lake for recreation has increased in recent years. With more people swimming in the lake, one would expect to hear more complaints about swimmer's itch, even if the number of parasites remained stable.

Twenty-six other states have documented the presence of swimmer's itch, including Washington, Oregon, Colorado, Alaska, and the Dakotas. Efforts to control it in some of these states have focused on the host organisms. A common control method in the past involved adding toxic chemicals, especially copper sulfate, to the lake water in an attempt to kill the host snails. This method did not prove to be an effective long-term control for swimmer's itch. More importantly, it is now illegal to add copper sulfate or any other toxic chemical to lakes in Montana for the purpose of swimmer's itch control.

Recently another approach has been tested in the fight against swimmer's itch. Researchers in Michigan have experimented with inoculation of waterfowl with a drug to kill flukes present in the birds. Results indicate a reduction in snail and waterfowl infection rates, as well as in the number of human reports of swimmer's itch. This control technique is expensive and has only been tried in a few locations in Michigan. While it could be considered for Flathead Lake, its feasibility is questionable given the massive effort and expense required to inoculate the thousands of common mergansers found on this large lake. Such an effort would need the blessing of a number of local, state, and federal regulatory agencies.

In the meantime, what can be done? The best management strategy is first to work to prevent further increases in nutrient loading in the lake, and second to minimize human exposure to swimmer's itch. When safe and practical, swimmers are encouraged to swim offshore, since snails, and the cercaria they release, are most common in shallow waters along the shoreline. People swimming in deeper, offshore waters rarely come in contact with the parasite. Small children are the most common targets for swimmer's itch, since they commonly play in shallow water where snails are most abundant.

The incidence of swimmer's itch also may be reduced by vigorously toweling off immediately after leaving the water. In the water the cercaria often simply adhere to the surface of the skin, while after emergence they are stimulated to begin burrowing. If one does develop a case of swimmer's itch, the symptoms may be relieved with over-the-counter lotions or oral medications containing diphenhydramine hydrochloride. Of course, one should also resist the urge to scratch. We hope that one day someone will discover a way to scratch swimmer's itch for good. ■



DAN S. SMITH

# Deep Blood Kettle

by Bruce Auchly

*Archaeological studies at Ulm Pishkun State Park are unlocking the secrets of what may be one of the largest buffalo jumps in the world.*

WHEN TOM ROLL SPEAKS, Great Falls' burghers listen—especially on the subject of Stone Age men and women killing bison. "This is the heart of bison killing country," says the 53-year-old Montana State University (MSU) archaeologist. "There is nothing like it anywhere in the world."

Roll should give halftime pep talks to MSU football teams. He could sell Montanans air conditioners in January. He certainly has convinced the people of north-central Montana of the archaeological treasures at Ulm Pishkun State Park. "He's a great salesman," says Stan Meyer, former head of the Cascade County Historical Society's Ulm Pishkun support committee and recently appointed chairman of the Fish, Wildlife & Parks Commission.

Last summer, Roll and a seven-member team of MSU faculty and students spent three weeks digging at Ulm Pishkun, five miles north of Ulm, a dozen miles west of Great Falls. In prehistoric times, people stampeded bison over a precipice, or pishkun, and killed them. The advent of the horse to the plains, in the early to mid-1700s, quickly antiquated bison driving. Pishkun, also spelled "piskun," apparently comes from a Blackfeet word meaning "deep blood kettle."

Last year's crew searched for any significant cultural deposits remaining after decades of illicit digging for artifacts and mining the bison bone deposits for use in animal feed. "The site hasn't been destroyed," Roll concludes. "There's a lot of good material there."

The team's findings supported by Roll's enthusiasm have persuaded many of the importance of Ulm Pishkun. "I think Ulm Pishkun will become a major destination," Meyer says, "a site of great interest to native Montanans, Native Americans, and people around the world to see how Native Americans lived thousands of years ago." During the past year, Meyer has been asked to speak on the subject at every service club in Great Falls. "I think they are intrigued by the idea," he says.

LOCAL INDIAN REPRESENTATIVES are intrigued by Ulm Pishkun as well, but not because of tourism. "The people who used these jumps were our people," says Deanna Parisian, coordinator for the Great Falls public schools Indian program. Parisian is in a difficult

DAN B SMITH

*For a thousand years, prehistoric people killed bison by running them over a cliff at Ulm Pishkun. Scientists are now seeking clues about these ancient civilizations amid bison fossils.*

position. Because of her work in the Great Falls schools, many non-Indians turn to her for advice. Parisian, however, is only 36, and in Indian culture elders should be giving advice. In addition, Parisian's ancestors are Hidatsa, a tribe originally located in North Dakota. As a result, she speaks in generalities about Ulm Pishkun.

Two years ago, an idea surfaced to upgrade Ulm Pishkun from a minor roadside attraction to a major tourism venture. The support group came to Parisian asking her to gather Indian elders and bless the site. An odd request, Parisian thought. "They wanted a sacred blessing, but the whole earth is sacred to Indians," she says.

After talking to the group, Parisian decided their efforts fell into two categories: preservation of the site, and education and awareness of the people who used it. She felt comfortable with both. Parisian brought in representatives of the Blackfeet, Assiniboine, Sioux, and Cree tribes. One afternoon in May 1991, the Indians conducted a pipe ceremony at the pishkun, praying to the Creator and the spirit of the buffalo.

"Everything that lives has a purpose. Everything that lives has a spirit," she says. "That buffalo gave his life for our ancestors. To the plains Indian, the buffalo was everything. It was food, shelter, and religion."

The Indian representatives endorsed the support group's efforts, not a tourist attraction, she emphasizes. But with cooperation, a development at the pishkun could help cross a cultural chasm. "I saw it as an opportunity for people who are not Indian to learn more about the buffalo and the buffalo spirit," Parisian says. Meyer also looks for the best in two worlds: "Tourism and education can go hand in hand."

BRUCE MCCURDY

LUCILLE LUNDIN

During last summer's dig, Parisian arranged for Delwin Firemoon, an Assiniboine-Sioux elder, to oversee the project. As Firemoon watched, the archaeology team, like so many worker ants, sifted through mounds of dirt. Day after day they delicately brushed away soil to reveal crumbling bison bones. The diggers and Firemoon also kept a lookout for human remains. None were found; if they had been, they would not have been disturbed.

"This is a pretty good crew," Firemoon concluded. Parisian echoes Firemoon, "Tom Roll was excellent. He was just real accepting and cautious of the area and findings."

Roll's approach to Ulm Pishkun stems from experience digging at six or seven bison jumps, most of them in Montana. But his passion for things archaeological goes back to boyhood in Kalispell.

---

*During last summer's dig, students and volunteers sifted through mounds of dirt for artifacts and bones (left). Delwin Firemoon (above), an Assiniboine-Sioux elder, watched over the project.*

*Prehistoric people used stone for weapons and cutting tools (below) to kill and cut up bison. The three-week dig yielded thousands of artifacts (right) to be identified and catalogued over the winter.*

BRUCE AUCHLY

BRUCE AUCHLY

"When I was 8 years old," Roll says, "I came down with the measles." His parents scoured the library and came home with books on the discovery of ancient Troy and King Tut's tomb. "Ever since then, I've been enthralled," he says. Trips across Marias Pass to the Museum of the Plains Indian in Browning also fueled the fire within.

For the past 25 years, the professional Roll has eschewed more exotic foreign sites to concentrate on bison jumps. "There are so many contradictions in the literature," he says. "There were a lot of conclusions arrived at without the proper justification."

Based on last summer's three-week dig, Roll and his more reticent team leaders, archaeologists Steve Aaberg and Jack Fisher, are convinced the pishkun's historical significance largely remains. "We came here not expecting anything and found rich deposits," Fisher says. "It was really surprising to me that we found anything," Aaberg adds. "Every backhoe dig we put in yielded something."

THE TEAM'S INITIAL APPREHENSION came from the site's modern history. Starting in the 1890s and lasting about 10 years, the cliff face was quarried for sandstone. Some of the rock was even used to build Helena's Presbyterian church.

Then, between 1945 and 1947, as much as 150 tons of bison bones were removed from the site, crushed and shipped away for use as a supplement in animal feed. And throughout this century, people dug up the soil for arrowheads and artifacts.

The cliff face runs for about a mile. About a fourth of the cliff lies on state land, the rest on private land recently purchased by media magnate Ted Turner. Apparently all of the commercial mining took place on the state land. Royalties and lease payments from bone mining brought the grand total of $864 to Montana coffers.

Roll freely admits that the writings of the late Maynard Shumate, an amateur archaeologist from Cascade, helped last year's dig tremendously. "He saved our bacon in many ways," Roll says. "He recorded the mining in the area. He was there at the time the bone miners were there. Afterward he went in and excavated to see if anything was left, and it was."

Shumate was not alone in his belief that the site held historical potential. Shortly after a permit to mine the bones was approved in 1945, a group of Great Falls residents lodged a protest to the Montana Board of Land Commissioners. "We realize that to some people this is but a pile of fertilizer, but to others it is the key to early Montana history, so let us not destroy it for the little there is in it for the state," the document reads.

The complaint fell on deaf ears. State officials sent a field investigator to look at the site. He reported back: "As for this bone deposit being kept for a historical site, I do not think it would be much good for there is nothing to see...."

An attempt to mine more bison bones in the late 1950s was quashed. Earl Monroe, a local rancher and member of the Montana Institute of the Arts, leased the land around the pishkun in 1958 because he saw people pillaging the site for bones and arrowheads. Eventually the Montana Historical Society obtained the lease, which was transferred in 1972 to the Montana Department of Fish and Game for a state monument. It was opened to the public in 1974.

Though permanently safe from further mining, Ulm Pishkun State Park continues to suffer from vandalism, ranging from an attempted burglary last year at the trailer used by the archaeological crew to people looking for arrowheads.

Last year's brief investigation yielded stone arrowheads, scrapers, and knives, leading the team to conclude that at least from 500 to 1500 A.D. prehistoric people

BRUCE AUCHLY

*Archaeologist Jack Fisher brushes dirt from layers of bone that reveal centuries of bison slaughter. The size of a single bison, let alone hundreds, would have required many people at butchering time, especially without modern conveniences like steel skinning knives and refrigeration.*

ran bison over the cliff at Ulm Pishkun. "This could be one of the largest [bison] kills, one of the largest jumps in the world," Roll says.

LIKE MOST HISTORICAL SCIENCES, archaeology mixes detective work with theory. Except for a few designs drawn on cliff faces, prehistoric inhabitants of North America's plains left no records of their activities. Archaeologists develop hypotheses on early cultures, then try to unearth clues that confirm or reject those guesses.

For students of North American history, the vanished residents of the Great Plains are the last frontier. Unlike the Aztecs and Incas, these mysterious people left no permanent dwellings. Yet a few theories have emerged based on kill sites like Ulm Pishkun.

"I could conceive of 1,000 people involved at a kill site," Roll says. "Even 200 or 300 people." That hardly coincides with the dime-store notion of small, nomadic bands constantly roving, searching the plains for sustenance and shelter.

"I think they were nomadic," Roll answers. "But I think their home range was very limited. These people didn't walk from Glendive to Cut Bank on a weekend."

Roll will not argue about the exact number of people taking part in a bison kill. Sheer logistics, however, dictate several dozen, at least. First, the size of a single bison, let alone hundreds, would have required many people at butchering time, especially without modern conveniences like steel skinning knives and refrigeration. "Once you get a buffalo down," Roll says, "you've got to butcher that sucker. Think about how long it would take you to cut up a bull into thin strips for drying." Second, moving the resulting jerky and the dozens or hundreds of people working there would have been an enormous undertaking. Third, bison are wary animals. To drive large numbers off a cliff would require an intimate knowledge of the animals' habits and the surrounding countryside. These prehistoric people, Roll says, "probably had a real good working relationship with the animals and knew how they would react."

Directly below the cliff, the crew found plenty of arrowheads, or "projectile points," but no tools. Several yards away from the cliff base, stone knives and scrapers began to appear. That indicates bison were killed with arrows where they tumbled over the cliff, then dragged away for processing.

Prior to 500 A.D., Roll says, most prehistoric hunters merely stripped the flesh off dead bison. After that time, archaeologists start to see evidence of

more intense processing of the meat into pemmican—a highly nutritious mixture of pulverized jerky and dried wild fruits. The concoction was held together and partially preserved by pouring rendered grease over it. Grease came from breaking apart the animal's bones and boiling them down. The nutrition in one pound of pemmican equals that in six pounds of fresh meat.

At one of the excavation pits near the processing site, a volunteer unearthed a stone maul, a tool probably used for many tasks, such as bone smashing and breaking up jerky. The find came during B.J. Fett's time in the trench. Fett is a 12-year-old from Cascade.

"B.J. grabbed this and said, 'Is this anything?'" Roll recalls, then breaks into a broad smile. "Archaeologists go a lifetime and never see a maul."

The crew discovered evidence of bison kills from early fall through early spring. The growth stage of unborn bison bones puts death in December through March, Fisher says. The wear and age of teeth found at the site, however, tell of killing from early fall to early winter. Rather than offering contradictory evidence, the bones and teeth seem to say the jump was used at many different times of the year.

BERNIE KUNTZ

*In his Montana State University laboratory, Tom Roll surveys bison bones from the 1992 Ulm Pishkun dig. He returned this year with a bigger crew for a five-week dig.*

Fisher also tells of finding bones of fox, rabbit, deer or antelope, and a large canid, such as a dog or wolf. Dogs have been domesticated in North America for at least 10,000 years. "It appears these people were living there for a while," he says.

Although everyone agrees that people used Ulm Pishkun to drive bison over the cliff and kill them, the exact details of a bison jump are still a matter of debate. Perhaps at sundown on one ancient February day, a group of prehistoric hunters finally relaxed, knowing that the killing and feasting would begin tomorrow.

Fifty members of the Stone Age community had spent several days working, prodding, moving the herd of bison to just the right spot on the butte. Two hundred yards to the south lay a 25-foot cliff. The bright noon sun on the morrow would blind stampeding animals to the danger ahead until too late, and days of plenty would replace days of want.

Unaware of their impending doom, a thousand bison milled about lazily on the flat field. Calving was a mere three months away. Barring a mistake that would spook the herd, the shaggy beasts soon would jump to their death, and a thousand years later archaeologists would search for clues among their bones at Ulm Pishkun State Park.

Late morning the next day, the young men and women began carefully moving the mammoth beasts. Piles of stones littered the field at strategic spots where the bison had to be turned one way, then another. On a signal, several men started shouting at a small group of bison outside the herd. At the same time, on the other side of the herd, men and women began running at another group of animals. In minutes the entire herd was rushing headlong for the cliff.

As the huge animals stampeded, the earth trembled. Men hugging the cliff face below readied their bows and arrows. The first line of bison reached the precipice. They realized the danger and tried to turn. But there was no escape. The panicking horde behind pushed them over the edge. Animals on the fringes did turn in time, others plunged over the cliff and landed on already downed animals. Some of this second wave survived and ran off. By the time the drive ended, scores of bison lay bellowing and writhing at the cliff base. They were soon finished off by arrow shots.

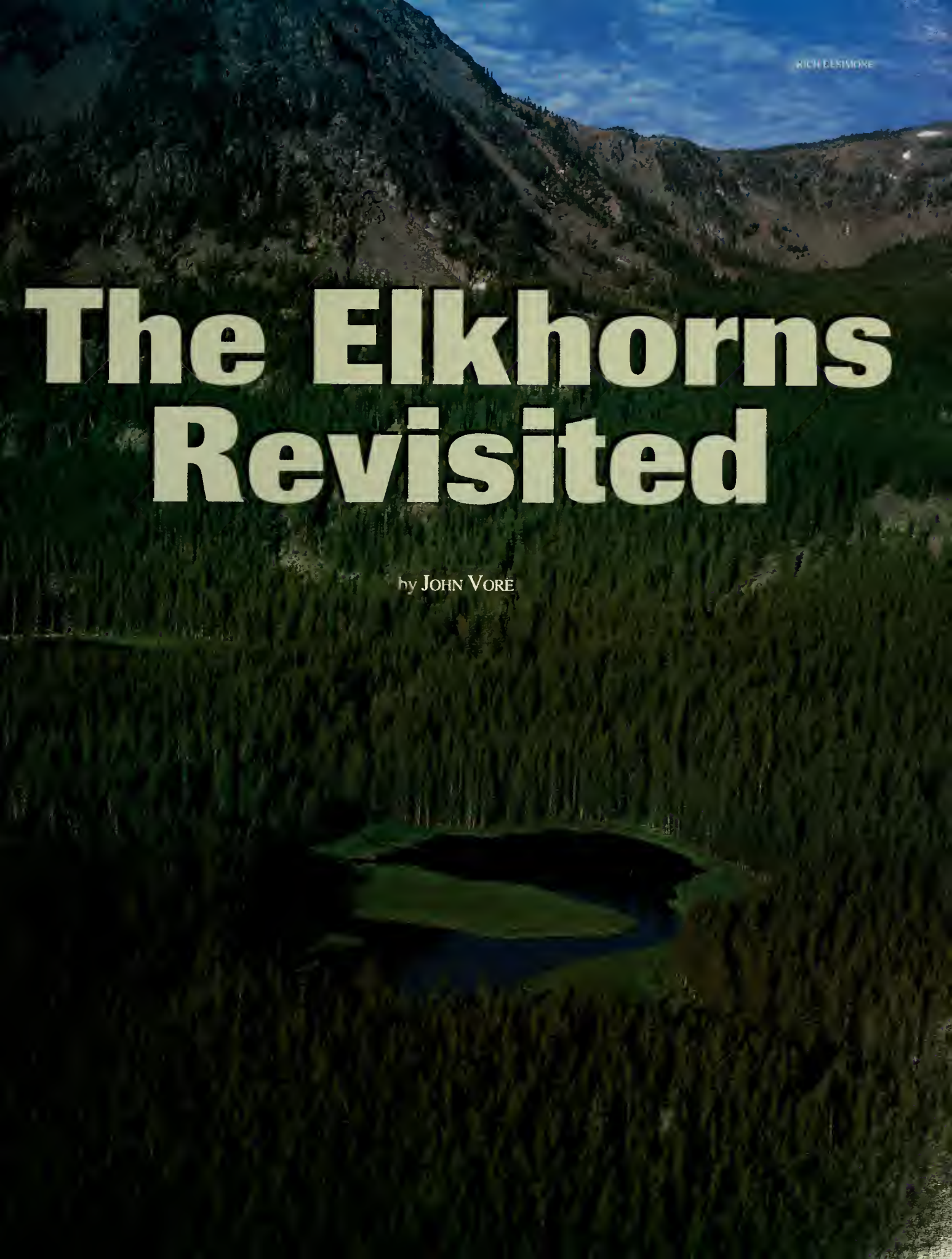
From 1992's brief three-week dig, the past has come alive for many north-central Montana residents who never gave Ulm Pishkun more than lip service or visited more than once in their lifetime. Now, everyone looks to the future.

With FW&P funding and private donations, Roll returned with a larger group this summer. The band of student and professional archaeologists completed a five-week dig around the end of June. This year's crew dug new trenches by hand for better control. Because of the exploratory nature of last year's investigation and time constraints, some of the trenches were dug by backhoe.

"Ulm Pishkun," Roll says, "is already listed in the National Register of Historic Places. Our work has only increased its significance."

That work remains far from finished. "We could dig there for 20 years with 50 people and not learn everything there is to learn," he says. "Though I would tire after 8 or 10 years."

Man in his element. ■



# The Elkhorns Revisited

by John Vore

*"Look straight ahead," Roger said into his mike as he glanced over his shoulder at me and pointed.*

*"All...right," I replied. The headset's mike felt cold as my lips brushed it lightly. I could faintly see my breath. We counted in our heads as we flew closer.*

*Roger's voice came crackling through the headphone static. "I've got twelve below the brush."*

*"Me too."*

*And then more, partially hidden in the snowy brush: "Fourteen, sixteen, eighteen, nineteen," I tallied aloud as the super cub banked steadily to starboard. Below us the ground was covered with fresh powder snow and lots of elk tracks. The sun, still new in the cold, cloudless sky, cast that peculiar peach-rose hue of early morning. The dark Douglas-firs contrasted with the sparkling new snow and tawny grasses as though polarized in the crystalline air.*

*"Wait, there's some more," said Roger excitedly. Roger Stradley, my good friend and a veteran mountain pilot who I literally trust with my life, sat directly in front of me in the only other seat in the plane. Sometimes I think I only know Roger by the back of his head. He loves his work, and was just as excited as I was by what we were seeing.*

*"Twenty, twenty-two, twenty-four," we counted in unison.*

*"Geez, and all branched, too!" I blurted. I thrust my gloved hand over his left shoulder so he could see where I was pointing. "Hey Roger, there's some more in that little patch of quakies at about ten o'clock."*

*Roger banked the plane easily, to port this time, always conscious of where we were in relation to the nearby ridges. It's close work counting elk.*

*"There's five," I said.*

*"Six."*

*"Yeah, I see him now." The circling plane brought the bull out from behind a tree. "There's another one under that other little tree, by those rocks. Any more?"*

*"Don't see any," Roger replied, glancing out the other window.*

*"Wow! Let's see...twenty-four and seven...thirty-one total. All branched bulls, too!"*

*"Fantastic! Merry Christmas!" Roger boomed through the headset.*

---

SEEING ELK IS ALWAYS a thrill, and seeing *those* bulls was a special treat. Roger and I had each seen more than 31 bulls in a group before, but not here, not in the Elkhorns. And they were branched bulls at that, meaning they were 2 years old or older. It was the winter of 1991/92, and we were surveying elk as part of a long-term research project. To understand our excitement, keep in mind that we had just seen over six times as many branched bulls in this one group as we had seen in the whole mountain range for all censuses from 1982 (when research began) to 1985 put together.

So what had happened between 1985 and 1992? To get the complete picture, we need to back up just a bit. The Elkhorn Mountains, about two stone throws and a jump southeast of Helena, are a small range barely 20 miles across no matter where you start. Elk hunting is far and away the most popular recreational pursuit; in fact, based on the number of hunters and amount of elk habitat, the Elkhorns are the most heavily hunted mountains in Montana. Currently, the U.S. Forest Service, Bureau of Land Management, and Montana Department of Fish, Wildlife & Parks (FW&P) cooperatively manage the public portions of the mountain range with wildlife as a management emphasis.

As some readers will know, the Elkhorns have a special kind of elk season (see *Montana Outdoors*, March/April 1985 and Sept./Oct. 1988). It's primarily a spike season, and to take a branch-antlered bull you need a special permit. It came about as a result of studies that began in 1982 to address the effects of land management on wildlife. As the studies got underway, it wasn't long before FW&P harvest and winter range surveys confirmed what hunters had been saying—there weren't many bull elk in the Elkhorns. In order to be as accurate as possible, winter range censuses were flown at least twice and sometimes three or four times. Combining all these surveys up to 1985—which means, of course, that some elk were counted repeatedly but that the herd composition would not change—8,885 elk were seen. Of these, only 148 were bulls, and only *five* were branched-antlered bulls!

Something was clearly wrong. Were we just not seeing the bulls that were there? Possibly, but other evidence indicated that was not the case. For one thing, hunters weren't seeing them either. A 1985 opinion survey showed that Elkhorns elk hunters thought the elk population as a whole was stable, but 60% noticed a decrease in bulls and 73% noticed a decrease in branch-antlered bulls.

Check station and field records showed that most of the elk harvested by hunters in the Elkhorns were yearlings. Of 229 elk checked in between 1982 and 1985, 85% were yearlings. Only five were older than 2, and none was older than 6. And this was a biased sample because special efforts were made to visit hunters who we heard had gotten branch-antlered bulls. So really the percentage of yearlings in the harvest was even higher.

Also, radio-collared bulls were not living very long. During the years when any antlered bull was legal for hunters to shoot, 31 of 34 marked yearlings were killed and all 14 marked 2-year-olds were harvested. No older bulls were marked because none could be found to put a radio collar on. Clearly, in those days a bull in the Elkhorns just didn't stand much of a chance to make it to his third birthday.

FW&P research biologist Rich DeSimone knew things were way out of whack. Unhunted elk herds are typically about 25%

MICHAEL J. BARLOW

*With the advent of the new spike season, mature bulls have returned to the Elkhorns.*

bulls, and three-fourths of them are branch-antlered. A lot of bulls in these herds are fully mature—i.e., over 6—and a few are as old as 12 to 14. Such bulls are important to the biological health of an elk herd (see *Montana Outdoors*, Nov./Dec. 1992). Yet, in the Elkhorns, such a creature seemed extinct.

As a matter of serendipitous circumstance, at about this same time hunters had approached the Montana Fish and Game Commission with the idea of managing some areas in the state to have a few older bulls. What better place to try something new than the Elkhorns? An elk hunting season was needed to protect some bulls and allow them to live to maturity while still letting anybody hunt who wanted to. It was a tall order, but FW&P biologists got their heads together and after heated debate came up with a new season: Only bulls with spike antlers would be legal to hunters with a general elk license, and bulls with antlers having one or more branches four inches or better could be harvested only by hunters with special permits.

The reasoning was this: Most yearling bulls are spikes, but a few yearlings (usually about 15%) and all older bulls have antlers with branches. By letting hunters take just spikes, some yearlings would be protected. Conservative numbers of branched bull permits would allow some bulls to live to maturity. Biologists agreed that the test of whether the system was working would hinge on numbers and ages of bulls in the new population. Objectives for the herd were that 7% to 10% of the wintering elk would be bulls, half of these bulls would be branch-antlered (2.5-plus years old), and over half of the branched bulls harvested would be 4 years old or older.

Initially, there was substantial opposition to the proposed season. The 1985 survey showed that 65% of Elkhorns hunters opposed it. But a lot of hunters also knew something needed to be done. With

their help and in no small part due to the dedication of FW&P biologist Rich DeSimone, the Fish and Game Commission adopted the new season.

In 1986, prior to the first year of the general spike season, hunters were allowed to harvest *only* branch-antlered bulls. The idea was to let one year class of spikes live through to be branched bulls. As expected, the bull harvest in 1986 was low because there weren't many branched bulls around. Most of those killed were branched yearlings. In retrospect, a branched-bull season preparatory to the spikes-only season was not such a good idea because hunters were confused by the change of regulations two years in a row.

WHAT HAS THE NEW SEASON done for the number of bulls in the Elkhorns? Prior to 1986, bulls averaged 1.7% of elk seen on the winter range. During winter flights in 1987, following the first year of the new season, 7% of all elk seen were bulls. Since then it has varied from 5.1% to 7.8%. So there's certainly been an increase in the total number of bulls.

But an even bigger difference has been in the number of branch-antlered bulls, those at least 2 years old. During years when any antlered bull was legal, the highest number of branch-antlered bulls seen on the winter range was two. Following the 1986 season, the one year in which only branch-antlered bulls could be taken, four branched bulls were seen on the winter range. Following the first year of the spike season, 50 branched bulls were seen. It has varied from 32 to 94 since.

But what about the ages of these older bulls? Are they living much past 3? From an airplane it's impossible to know the exact ages of the bulls you're seeing. With enough practice, though, you can get a rough idea—for example, you can tell a 2-year-old from a mature bull over 6. But we needed something more precise, so we began taking teeth from harvested bulls and sending them to a lab where rings in the dental cementum of incisor teeth are counted, not unlike aging a tree.

As expected, branched bulls taken the first year of the new season by permit holders were all 2 years old. However, each year since then has seen older bulls in the harvest, and that means more older bulls are in the population. In 1991, 52% of the branched bulls harvested by permit holders were 4 years old or older. By fall of 1992, bugles of 7-year-old bulls were echoing through the Elkhorns. This fall some will be older yet.

Another measure of the size of Elkhorns bulls is the Boone and Crockett scores. Over the last three years I've scored more than 100 bulls from the Elkhorns. In 1992 I had the opportunity to score a sample of 19. Of those, six scored over 300 points. The biggest was a 7-year-old bull scoring 341—an impressive elk by anyone's standards, and certainly a mature one.

There's no doubt that the spike season in the Elkhorns has been a tremendous success for the elk herd. But do people like it? According to a 1989 opinion survey that sampled roughly a third of Elkhorns elk hunters, 80% liked the idea of managing for older bulls and 73% wanted to keep the spike season. Also, 84% felt the number of total bulls was stable or increasing and 85% thought the number of branched bulls was stable or increasing. That's quite a change from the opinions expressed by hunters in 1985.

We initially feared that a more restrictive elk season might cause people to quit hunting in the Elkhorns. The number of hunters dropped by 5% the first year. But 1991 set a record for the number of elk hunters in the Elkhorns, and 1992 broke that.

Many people, hunters and non-hunters alike, thrill to the sight of a mature bull elk. In my job I spend most of the hunting season in the Elkhorns talking with hunters. It's rare for a hunter to have seen a mature bull and not comment on what a thrill it was and how it added to the hunt.

Outside the hunting season, more and more people are heading to the Elkhorns to watch, photograph, and listen to elk. A lot of people love it. On a frosty September morning, one can almost feel a bull's surging hormones as his throaty bugle peals through the dark canyons. In winter, a group of mature bulls feeding on a wind-blown hillside is a spectacular sight and a symbol of Montana's commitment to its wildlife.

People often ask if some other type of regulation, such as a branch-antlered or brow-tined bull season, would accomplish the same thing in the Elkhorns. With this type of season, a bull is not legal game until it's 2 years old. Such a season would doubtless increase the number of bulls on the winter range by protecting yearlings, but with the known high hunting mortality of legal bulls in the Elkhorns, few would survive to maturity.

In the Gravelly Mountains, an area similar to but much larger than the Elkhorns, FW&P biologists have intensively studied elk for over 10 years. During this time, hunters have been allowed to harvest only branch-antlered or brow-tined bulls. To be sure, the number of bulls on the winter range has increased, but they are over 90% yearlings. Very few bulls live longer than 3 years.

There are a lot of sound biological reasons to manage an elk herd so that it contains mature bulls. It's just wise game management. Yet, in addition to biology, the reasons run much deeper in our fabric. Our moral and ethical senses are piqued when we see natural systems out of balance. The latest book from world renowned biologist Edward O. Wilson of Harvard University, "The Diversity of Life," points out how important the natural world is to people. He argues that we *need* it. It's part of our makeup. He even says that caring for nature is an innate part of our spirituality. People care. We've certainly found that Montanans and many others care a lot about bull elk in the Elkhorns.

I should point out that the spike season is not an elk management panacea. For one thing, if managing to approximate naturally occurring age and sex ratios is desired, the Elkhorns herd still falls short in the number and ages of bulls. Although these have increased by several hundred percent, they are still only about a quarter of the potential. For another, we can't overlook the importance of high-quality, secure elk habitat. Hunting regulations in and of themselves cannot provide all the necessary ingredients for healthy elk populations. But creative management can help in maintaining

more balanced, productive elk herds that contain animals of all ages.

---

*My legs were getting a little cramped, my rear end a little flat, and the hint of a chill was creeping through my coveralls as Roger headed us back to the Townsend airport. For five and a half hours we had scanned and circled and squinted and tallied and bantered back and forth through the crackling headsets. I don't know how Roger was feeling as he set us down for yet another perfect landing. Perhaps he was feeling the same as I was—happy there were some mature bull elk in the Elkhorns.* ■

JOHN VORE

JOHN VORE

# Elk Watchers

As is true in all walks of life, it's people that can really make the difference. Every year, thousands of people come to the Elkhorn Mountains to hunt, fish, photograph, hike, watch wildlife, and just enjoy themselves. Elk management in the Elkhorns has strong public support.

**Russ Forba** loves to hunt and watch elk. As with any true sportsman or woman, his concern for elk goes much deeper than just hunting. He lives in the foothills of the Elkhorns and enjoys the nearness of his passion year-round.

"I've gone whole seasons in other areas and not seen as many mature bulls as I can see in one day in the Elkhorns," says Russ. "Even though I can't shoot one without a permit, it's a real thrill to see them. I think one reason a lot of people hunt the Elkhorns is just for the chance to see a mature bull. Some get frustrated, mostly because they can't shoot one. But if it weren't for the spike season, those old bulls wouldn't be there. About nine out of ten comments I hear from people about the season are good. I get to see these bulls year-round. There just aren't that many places you can do that."

**Leslie O'Neil** spends a lot of time throughout the year in the Elkhorns watching and photographing elk. When it comes to elk her enthusiasm is infectious, her love and concern genuine.

"I've been going into the Elkhorns since 1972, mostly to watch and photograph wildlife," she says. "There's a lot more mature bulls around now because of the season, and it makes it a lot of fun. It's great to watch an old bull and follow him through the year. I think the more people go in and see what we've got, the more interested they become. We're very lucky to have it there."